A.I.D. Project Impact Evaluation Report No. 12

Korean Irrigation

December 1980

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No. 12: Korean Irrigation (December 1980)

(continued inside back cover)

KOREAN IRRIGATION

PROJECT IMPACT EVALUATION NO. 12

by

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TABLE OF CONTENTS

SUMMARY

The Korean irrigation project, to which A.I.D. contributed $25.7 million beginning in September 1974, had as its goal assisting Korea to become self-sufficient in rice and barley and raising farm household income in project areas by $412 annually. These targets were to be achieved through the construction of "up to 66" irrigation works of various types. The project was part of a major continuing program by the Korean government to expand irrigation of paddy and improve the gross discrepancies between urban and rural income, the latter having lagged as planning concentrated on industrial and export-oriented development. Korea today has virtually 100 percent irrigation to some degree on paddy land. This and other factors have made the Korean farmer the most productive rice farmer in the world per hectare.

Fifty-five projects were completed with AID funds. Rice self-sufficiency was achieved by 1975, soon after the project agreement was signed. Thus, the project made only a marginal contribution to that end, but it will positively contribute to sustaining self-sufficiency. The project did not help achieve improved barley production, which has been declining steadily due to the very high government rice support price and the growing demand for wheat in urban areas. Farmers' incomes did rise by the specified amount on most farms, given the rice support price, but income levels in rural Korea are directly correlated with farm size; thus the project has affected beneficiaries unevenly in spite of an effective land reform. Average rice yields in project sites increased 2.0 metric tons per hectare, or 1 metric ton on the average farm of one-half hectare.

Overall the project was successful in improving yields of rice. The project was a single-focused effort on irrigation alone, and did not require any technical assistance. Its success was dependent upon a complex of other factors that were in place, including a high degree of engineering and administrative competence, delivery of extension services, agricultural inputs, and a high rice procurement price (more than double world prices). The projects are economically replicable and sustainable at the Korean rice price and would be viable if both international input and output prices prevailed in Korea. They are also economically possible because of a variety of sunk costs in previous construction and social infrastructures.

Farmers have shown an acute awareness of market forces and are tied into the urban economy because of improved transportation, education, and information. This is evidenced by the production of winter vegetables, which has become a major rural industry.

The success of the project was achieved with little decision-making participation by the rural population, which is mobilized into a variety of organizations each of which demand time, money, and labor without commensurate meaningful involvement in planning. Farm Land Improvement Associations are not cooperatives, but bureaucratic means by which to deliver water and collect fees. They are very efficient.

Women were not mentioned in the project design, and have experienced both gains and losses. They have shared in greater household income, but now have a greater agricultural workload due to new cultivation methods while continuing very labor-intensive housework. More children are going to school, and their labor participation has declined.

Irrigation recipients view their lives as having improved with irrigation, although that alone was not the single causative factor. With increased income, additional education becomes the first priority of the families, with the purchase of household amenities second. Improved nutrition is not regarded as of importance. Education is viewed as an avenue of social and physical mobility, enabling the recipient to leave the farm for urban employment. Farmers do not want their children to follow in that occupation.

This results in an overall aging of the farm population, and has important implications for the future of the rural sector. A prolonged industrial recession, which Korea may already have entered, could bring numbers of migrating youth back to the villages as urban jobs are reduced; these are likely to be the least educated, and the least entrepreneurial. This recession could mean the Korean government will likely be under pressure to lower the support price of rice. The Korean farmer is dependent on "high technology" farm practices, including powered equipment and heavy use of purchased inputs. Since the average farm size is very small, and consequently total production per farm is low, it is doubtful that the government's policy to use urban to rural transfer payments to equalize rural and urban incomes for small farmers will continue to be successful if urban incomes continue to grow.

Good water control and successful irrigation provide a means to increase and stabilize the levels of farm production. Irrigation can be cost effective under certain conditions, but such conditions in general are scarce, and becoming scarcer.

Pollution of irrigation water, which is used for washing and sometimes for drinking may be becoming an issue needing study. Thought should be given to use of some of the more traditional though improved rice strains that are less susceptible to disease.

Korean rural development, which includes irrigation but also encompasses reforestation, cooperatives and the Sae-maul (New Village) Movement, as well as high price supports, has been successful in the Korean context. Its reliance on the availability of other inputs, the sunk costs in infrastructure, the authoritarian nature of decision-making and lack of participation, and the unequal benefits to women, preclude it as a model for AID programming.

As "North" countries have been exhorted to provide greater support to "South" nations for mutual benefits, so within a country the urban sector may have to support the rural population for increased food production and national policy reasons in cases where irrigation may not be economic in the short term.

PREFACE

The remarkable progress that Korea has made in industrial growth and export earnings has sometimes overshadowed important developments that have occurred in rural areas. Rural improvement has been relatively recent, but it has been rapid, although not without problems that may intensify. An element of that growth has been the massive expansion of irrigation systems, so that today about 100 percent of Korean paddy land is irrigated to some degree.

This project, to which the United States Government contributed $25.7 million, was a small element in the gradual transformation of rural Korea. It has helped spur growth in those enclaves where such systems were built. It essentially funded Korean-designed systems, offering no new technological or administrative support. The major credit for rural change must go to aspects of Korean macro-economic policy and administration. The team, driving some 2,300 kilometers in 8 provinces, visited over 27 percent of the project sites, representing 38 percent of the total hectarage irrigated (see Appendix A).

This impact evaluation team was composed of two A.I.D. staff, an outside British consultant, and a Korean sociologist. The comments in the main report should be attributed to the team alone; certain appendices were the products of single individuals. The team wishes to thank Mr. Shim Jae-woong and Ms. Chung Dok-ae, translators, who both were invaluable associates and pleasant companions. Mr. Lee Sung-gun of USAID was a welcome addition in our field work.

Most importantly, the team wishes to express its deep appreciation to the many dozens of Korean men and women farmers living in the irrigated areas visited. They took time from their onerous tasks and obligations to talk frankly with us, and their hospitality and warmth made our too brief visit most enjoyable. Our thanks go also to those Korean government officials at the gun and myon level who guided us and provided us with a great deal of data from their voluminous records. The U.S. Embassy and A.I.D. Mission were most helpful and cooperative in supplying logistical and typing support.

PROJECT DATA SHEET

Project Title: Irrigation Project - Korea

A.I.D. Project Number: 489-0706

A.I.D. Loan Number: 489-T-090

Borrower: The Government of the Republic of Korea. The project was implemented by the Agricultural Development Corporation (ADC) of the Ministry of Agriculture and Fisheries.

Loan Amount: Total $25.7 million.

Original: $17.2 million. Loan Agreement signed September 11, 1974.

First Amendment: $6.5 million. Amendment signed April 30, 1975.

Second Amendment: $2 million. Amendment signed September 13, 1975.

Korean Contribution $6.425 million

Total Project Costs: $32,125 million*

Terms: 40 years repayment from the date of the first disbursement, including 10 year grace period. Interest rate of 2 percent per annum for 10 years after the first disbursement and at a rate of 3 percent per annum thereafter.

Terminal Date for Request for Reimbursement and for Disbursement:

March 11, 1978.

Purpose: To assist accelerating ROK efforts to expand the production of rice and barley through the utilization of water resources in up to 66 small/medium scale irrigation projects and thereby assist up to approximately 95,000 farmers to increase their net incomes by an average of $412 per year.

Accomplishments: Completion of 55 irrigation systems in the 7 provinces of mainland Korea.

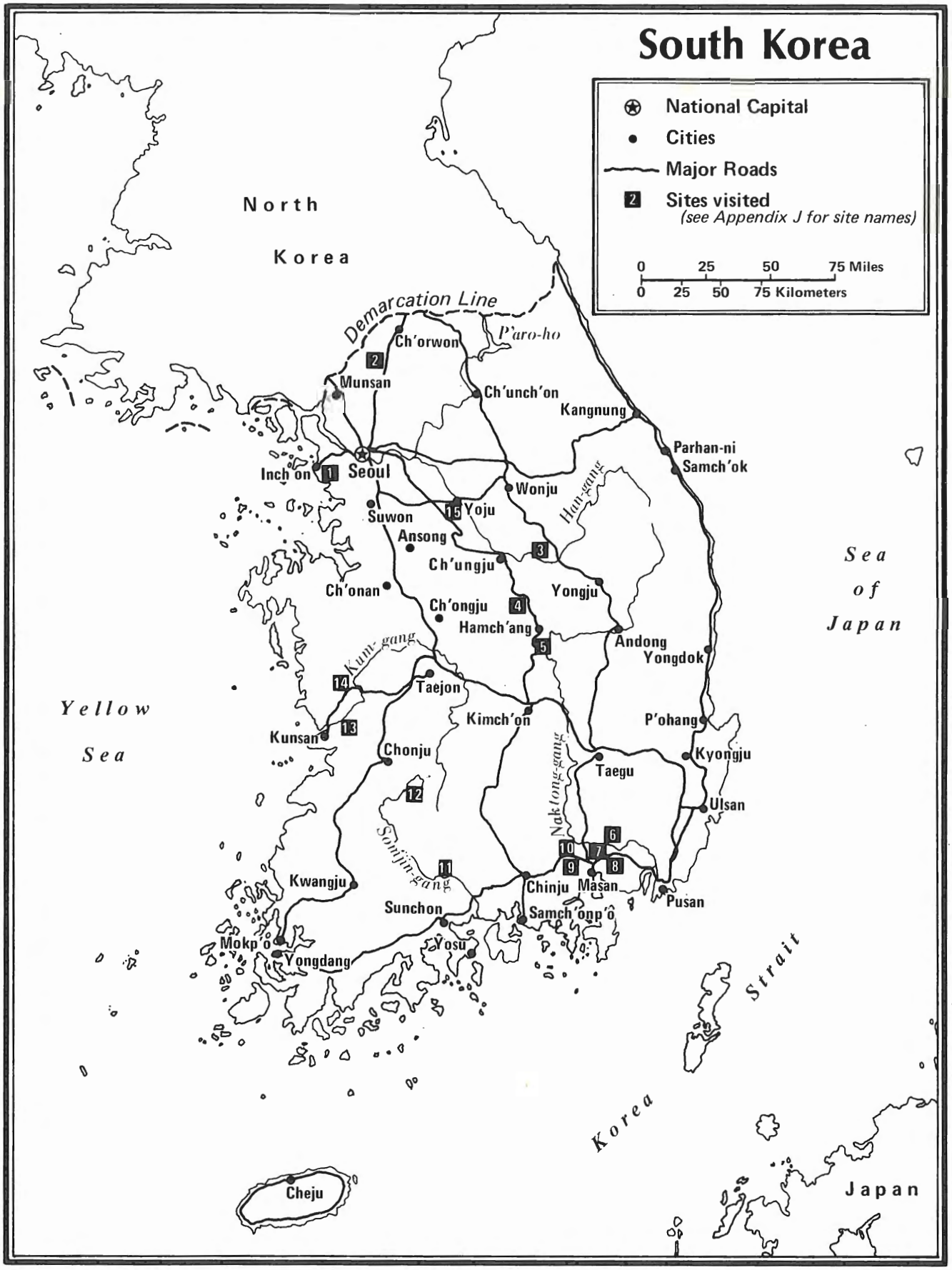
*These figures do not include sunk costs; i.e., construction costs incurred before the project was approved. All projects had been started earlier. This total cost of the 55 irrigation systems is much higher.

GLOSSARY

ADC	Agricultural Development Corporation, Ministry of Agriculture and Fisheries.
Chongbo	Unit of measurement, approximately equal to one hectare.
FLIA	Farm Land Improvement Association: a government-sponsored and controlled water users association.
Gama	A unit of volume, equal to 80 kg. of milled rice or 54 kg. of paddy.
Gun	County; 140 throughout the country.
Gunsu	County chief, appointed by the Ministry of Home Affairs.
Ichang	(Yichang, Lichang, or Rheechang) village head.
MAF	Ministry of Agriculture and Fisheries.
Myon	Township; a part of a gun.
Myonchang	Township head; appointed on authority of the governor.
NACF	National Agricultural Cooperative Federation; a government-sponsored means to provide agricultural inputs, credit, and assist in government grain procurement, storage, and marketing.
ORD	Office of Rural Development, Ministry of Agriculture and Fisheries.
Paddy	Unhusked rice.
Pyong	Unit of land measurement; 36 sq. feet; 3,000 pyong equal one chongbo or hectare.
ROK	Republic of Korea.
Sae-maul Undong	"New Village Movement", or "New Community Movement", a government-controlled rural development activity.
Sae-Maum Undong	"New Heart (or mind) Movement". The ideological equivalent of the New Village Movement; designed to instill traditional Confucian virtues and ideological conformity and obedience. Similar to the Chinese New Life Movement in the 1930s.

Note on Korean Romanization

The Korean Government has adopted a system of romanization that neither approximates the Korean equivalent nor is useful for English speakers. Additionally, it has changed traditionally accepted Korean place-name spellings. In this paper the modified McCune-Reischauer system without diacritical marks is used, as preferred in some academic journals. Appendix J gives the Chinese characters for all sites selected, as well as their locations.


South Korea
National Capital
Cities
Major Roads
Sites visited
(see Appendix J for site names)
0 25 50 75 Miles
0 25 50 75 Kilometers
North Korea
Demarcation Line
P'aro-ho
Ch'orwon
Munsan
Ch'unch'on
Kangnung
Parhan-ni
Samch'ok
Inch'on
Seoul
Wonju
Suwon
Yoju
Han-gang
Ansong
Ch'ungju
Yongju
Ch'onan
Ch'ongju
Hamch'ang
Andong
Yongdok
Kum-gang
Taejon
Kimch'on
P'ohang
Yellow Sea
Kunsan
Chonju
Taegu
Kyongju
Nakdong-gang
Ulsan
Sonjin-gang
Kwangju
Chinju
Masan
Pusan
Sunchon
Samch'onp'o
Mokp'o
Yosu
Yongdang
Sea of Japan
Strait
Korea
Japan
Cheju

I. PROJECT SETTING

At the IBRD-sponsored Korean Donor Group Meeting in December 1972, the Korean government formally requested assistance from the world community for intensification of support to Korean irrigation. Already widespread, irrigation was part of a complex strategy for rural growth that had its origins in the political and economic milieu of the earlier two years.

In economic terms, Korea in 1972 was changing rapidly. Korean exports, which were a token $55 million in 1962, reached $1.7 billion by 1972. Industry had climbed from 9.1 percent of the GNP to 21.1 percent over that decade. Urban incomes were double those of a decade before, and the GNP had begun its spectacular climb, averaging 8.7 percent annual growth by that year. However, agriculture as a percentage of national income had dropped from 35.6 to 24.2 percent. Industrial progress reflected national economic policies and priorities of the first two Five-Year Plans (1962-1971).

The rural sector, however, had been neglected. Agriculture had grown annually by 3.8 percent between 1959-1969, although industry burgeoned at 8.2 percent. Rural neglect was dramatically illustrated in the presidential election of 1971, which President Park narrowly won, but with greatly reduced rural support. This marginal victory caused deep governmental concern. Changes in agricultural policy, already in process, were accelerated.

External factors also were influential. In 1970-1971 the terms of PL 480 support began to harden, and rice imports became more of a drain on Korean foreign exchange. (See Appendix F.) In 1969 a dual grain price-support system was initiated, providing higher farm prices while subsidizing urban consumers.

The Third Five-Year Plan (1972-1976), was designed to redress the balance between urban and rural incomes, and in 1971 the Sae-maul (New Village) Movement started. Its origins were as much political as economic, providing immediate village mobilization to support the rural emphasis of the Plan.

Farmers in 1972 were poor. The annual income of farming families of over six persons rose from $421 in 1965 to $702 in 1970 in current terms, but the consumer price index had almost doubled. Industrial growth had escalated urban income almost twice as fast as farm income. Migration to urban areas was widespread, as both young men and women sought off-farm employment.

In 1972 Korea had insufficient rice and barley. That year, $103 million of rice and $22 million of barley were imported. The national plan stipulated Korea was to reach self-sufficiency in these two most important staple grains.

In spite of overall adequate annual rainfall, its distribution in Korea is inadequate at critical periods in the growing season. Thus,

improved irrigation of the nation's few major river basins and the development of smaller-scale systems in the hills and on small plains were means to improve agricultural production and increase farm income. Without water control, farmers are subject to the vagaries of drought about once every four years. Irrigation is a form of crop insurance, both for the farmer by providing stability of income, and for the nation by assuring stability of national yields.

II. THE PROJECT

At the time of the Donor Group Meeting in 1972, the IBRD was supporting major river basin development (see Appendix H). A.I.D. agreed to consider funding smaller-scale systems.

The Korean government suggested that A.I.D. support 88 small scale irrigation projects on which work had already begun. A.I.D. picked 66 of these systems and agreed in May 1974 on a loan of $17.2 million. An agreement on this project was signed in Seoul on September 11, 1974. Amendments were later signed for $6.5 million and $2 million. Thus, the total U.S. contribution was $25.7 million, only a small percentage of Korea's total investment in irrigation and rural development.

The goals of the project were to minimize rice and barley imports and increase rural incomes, while the purposes were to improve production of rice and barley through irrigation, and simultaneously to raise farm income by $412 per year.[1]

An anticipated subsidiary benefit was the strengthening of the Farm Land Improvement Association (FLIA), a water users' "cooperative" that operates under the guidance of the Agricultural Development Corporation (ADC) of the Ministry of Agriculture and Fisheries.

The 66 sub-projects that were picked for support included pumping systems, drainage, reservoir construction, and land reclamation. Construction on all of these projects had already started; some were nearly finished. A.I.D. funds hastened the completion of the systems. A.I.D., after supplying some initial capital, reimbursed the government for 75 percent of the costs of each system after it was operational. No technical assistance was provided, as the government entities were well-staffed and competent. This was a project admirably suited to the purposes of both governments. It was in an area of mutual priority, and its beneficiaries were appropriate for A.I.D. support. It required little monitoring. It was, in effect, a project easy to conceive and to implement with the decreasing staff in the A.I.D. Mission. Thus, A.I.D. added nothing but funds to a Korean effort. This was a project that the Koreans would have completed in any case. It appears that A.I.D. was programming

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[1]The original project paper had no logical framework and no goal statement. The first amendment had both, but dropped the dollar figure. This paragraph represents an amalgam of both documents.

nationally up to a prescribed level of financial support. Nevertheless, these types of irrigation systems and their operation in the context of Korean rural progress offer important lessons to development planners.

The policy environment for project design was favorable. Government rice and barley support prices and procurement policies were major inducements to farmers. There was an effective and efficient rural administration, even if autocratic. Extension services reached most rural areas, and the National Agricultural Cooperative Federation (NACF) provided information and marketing assistance, seed, fertilizer, pesticides, herbicides, and credit, as well as some cash loans.

The rural population was changing from a traditional peasantry to an integrated element of the national scene. Farmers were no longer isolated. They were aware of the market and government policies. Roads had improved and rural transport had increased. Farmers had radios, and were soon to get television. Newspapers circulated in villages. Rural isolation was dramatically and irrevocably broken.

The final disbursements from this project were completed in March 1978, with complete drawdown of the original loan and its two amendments. All sub-projects were then in operation; some have been working for almost six years. Some were completed by December 1974. No formal evaluations were done on the project, although it had been studied and baseline data collected (see Appendix A on methodology). Thus, the systems are suitable for impact evaluation.

These irrigation project sites are heterogeneous. They exist in every mainland province. Some are in isolated valleys, others close to urban centers. From 70 to over 2,000 hectares, many sites are small but discrete elements of larger systems dependent on previously constructed dikes or irrigation works, some of which are almost fifty years old. The systems are often sophisticated, with some pumps alternating between irrigation and drainage; some have long aquaducts snaking through the hills. If the irrigation works and their locations cannot easily be categorized, the administrative systems are standard. A Farm Land Improvement Association (FLIA), controlled and operated as part of the government bureaucracy, is the model. This organization sets water fees, collects payments, maintains the systems, and evolves internal patterns for water distribution.

The 1974 project design did not specifically deal with employment, migration, or women. It obliquely referenced participation through the expansion of the FLIAs. Yet these issues are all so germane to A.I.D. today, and were explicitly of concern at the time of project preparation, that they are given extensive treatment in the analysis. Korean rural development has been made up of many-faceted, individual programs reinforcing or complementing each other. Irrigation has been a necessary, but not sufficient, means to progress, and cannot be considered separately from concommitant development efforts or macro-economic policies. Thus, several Korean programs will be discussed in this evaluation and its appendices This does not imply that this project should have considered all these factors, but that the project's results cannot be analyzed without them.

III. PROJECT IMPACTS: FINDINGS AND ANALYSIS

A. On-Farm Results

The project agreement called for support for "up to" 66 irrigation systems. Fifty-five sub-projects were completed with A.I.D. funds, and are in full operation. The other 11 sub-projects are still under construction because many were larger, and will be finished by the Korean government. The goal of self-sufficiency in rice and barley was achieved essentially without project support. By 1975 Korea was self-sufficient in both grains. The project will, however, help sustain this self-sufficiency, although dietary changes are replacing the importance of barley with wheat.[2]

Interviews with FLIA officials and with farmers and their wives revealed that rice yields and total rice production increased significantly during 1974-1979. The exception was the most southern areas affected by a typhoon in 1979 and by blast disease in 1978. The FLIA records show that the average project areas had a yield increase of 2.4 metric tons per hectare (mt/ha) after full irrigation; the range was 1.5 to 3.6 mt/ha of polished rice. Some land, perhaps 10-15 percent, changed from upland crops of peanuts, soybeans, and vegetables to fully irrigated paddy. Those farmers who converted to rice maintained they were much better off. Farmers who grew rice before the project quoted increased yields from 1.2 mt/ha to 3.3 mt/ha; the average 2.0 mt/ha. The principal determinant in yield increments was the condition of irrigation prior to the project. On land of comparable quality, total yields are now all within the range of 4.5 to 5.0 mt/ha.

The goal of augmented income of $412 per family was the equivalent of 1.2 metric tons (mt) of rice at the international price estimated in the 1974 project paper. In retrospect this seems to have been a very ambitious target. With average farm sizes for the project areas of only a half hectare producing 1.2 mt before the project, this meant that production would have to increase by 100 percent. Average rice production on an average-sized farm of one-half hectare increased about 1.0 mt. At international rice prices, only the significantly larger-than-average farm could have reached the income goal because farm income is so clearly a function of farm size. However, even small farm units probably met the raised income target because of the high domestic support price for rice. The Korean Government supported the price at about $762 in 1979 against a 1974-1979 world average of about $360 mt.

At domestic prices, a farmer with a half hectare needed only an incremental increase of 0.6 mt of rice above prior production of 1.3 mt, net of production costs, to meet income targets. Since current total production from a half hectare is about 2 to 2.5 mt, it seems highly probable that the target for additional income has been met by almost all owner-operators. Renters, who pay owners about half the total production,

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[2]See Appendix I for statistics on self-sufficiency ratios for these three grains.

and who bear most, if not all, production costs, appeared to be in a very precarious position, if they were relying on rice alone.

Since rice yields increased some 50-75 percent, and some new rice lands were brought into production, the project positively and effectively contributed to sustaining national rice production goals. Farm income objectives were also met from rice alone, with the exception of the very small and part-time farmers. However, this holds true only at the present support price.

The anticipated benefits of barley production to national cereal goals were not achieved. Nationally, barley production has declined from a high of 1.8 million mt in 1976 to an estimated near-record low of .8 million mt for 1980. This past year, the project areas have overwhelmingly quit barley production. In the barley-growing area of the survey sample, only one village grew a significant amount of barley. Secure irrigation water, a high rice price policy, a formidable array of available production inputs, a lessening demand for barley and a rapidly growing demand for fresh fall, winter, and spring vegetables encouraged farmers to concentrate efforts on vinyl house production of off-season vegetables--all at the cost of barley, a relatively unprofitable crop. Winter farming efforts are now focused on vinyl house crops. There is a negative effect on rice yields when barley is grown; its June maturity invades on the optimal time for the rice regime. With the security of irrigation, availability of other inputs, the high guaranteed rice price, agronomic and labor constraints, certain farmers' financial ability to assume high risks, and the potential high returns on vinyl crops, the farm family has rationally opted out of barley. Farmers not growing crops under vinyl, which often requires private credit at high interest rates, may simply opt for maximizing returns to rice and leisure. Thus, rising consumer incomes allowed a shift of effort toward more rewarding personal, rather than national, objectives.

Farmers are now extremely specialized in the production of all crops, in part because of irrigation and limited arable land, but more generally because of greater total demand for a widening market. Korean agriculture is small scale but "high technology" oriented. Very heavy dosages of fertilizer and numerous pest control treatments are evident. Steel-framed vinyl houses are abundant. Tillers, and a wide variety of power sprayers, power pumps and powered transport are equally widespread. The irrigation systems are largely and critically dependent upon diesel or electric driven irrigation and drainage pumps. While striving for self-sufficiency in cereals, the farming community has become heavily dependent upon imported sources of energy for irrigation and farming, since the nation has no petroleum. Import dependence is also high for intermediate goods used in the manufacture of farm production inputs.

This project was focused on the delivery of a single critical factor--water. It basically succeeded where many similar projects in other societies failed. This success may be attributed to efficient technical management and effective concommitant delivery of a wide variety of agricultural inputs and services, conditions absent in many parts of the world. The project also capitalized on past irrigation programs and other current activities. To be profitable, water management must be associated

with sound plant breeding programs, fertilizer delivery, rural credit, credit, extension services, and a host of other ingredients. It is therefore not possible to isolate all the critical causal relationships--discussion of some of them follow--to which must be added the values and motivation of farm families as well as the incentives and sanctions resulting from government policy.

The irrigation systems are well designed. Korea is a difficult environment in which to manage irrigation. Unpredictable and relatively heavy rainfall causes floods or excessive water on the rice-growing alluvial plains. Drainage problems result. The variety of irrigation systems supported under this project called for sophisticated design and management. This impressive engineering and management commitment was essential to project effectiveness. The Korean government had tried simpler water management systems, such as bench terracing and small, shallow wells. They did not succeed. Currently, from upland watershed to on-farm use, overall water management can be characterized as excellent.

The high rice price policy of the government makes investment in rice cultivation profitable. It covers risk and uncertainty, labor, management, and return on capital. It is an apparent transfer of income from urban consumers and taxpayers to farmers, because cheaper, if less palatable, rice could be imported. Improved farm income in turn flows back to the urban-industrial sector through purchase of education, consumer durables, and consumption items. The increased availability of goods and services has accompanied the incentive rice price. The extent to which high rice prices paid to farmers are passed back to poor urban consumers through increased retail prices, higher taxes, or inflation has high social costs for that group, as well as for farmers with little land.

Fertilizer, pest management, chemicals, tillers, sprayers, improved seed, and productive credit are widely available. They have been necessary to project success. Furthermore, the farmers know, or have been taught, how to use effectively these materials and have been motivated to do so. All the high-yielding varieties of rice require heavy fertilization; the newer strains are more susceptible to disease, but with only marginally better yields than some of the older, but improved, varieties.

The government subsidizes the routine operations and capital costs of irrigation systems. Government subsidy of the operations, management, depreciation, and capitalization of these systems ensures proper functioning and supports a higher farm income than if all costs were recovered.

Sunk costs in physical and social infrastructure influenced the success of irrigation and rice production. Although the combination irrigation and drainage systems serve discrete land areas, they are often part of very large river diking systems or depend on river basin control dams that make the irrigation systems possible. The overall road system, electric grid, spare parts availability, and general physical infrastructure are critical to the successful building and operation of the irrigation systems. Equally apparent are the sunk costs in human capital from the farm families and throughout the society.

B. Farm Income and Wealth Distribution

Data on farm size distribution reveal a range of 0.2 hectares to 2.0 hectares with a mean of around 0.5 hectares. Although these farms are all small by many standards, there is, of course, still an income and wealth differential between the smaller and larger farmers. The value of the irrigation is capitalized into the value of land, and greatly increases the wealth position of the larger land owners. The smaller farmers are still in some situations net buyers of high-priced rice, while the larger farms have the marketable surplus. Renting irrigated land to other farmers appears much more profitable than renting it from landlords (see Appendix C).

Income and wealth differentials appear to be largely functions of farm ownership and farm size, although several apparently well-off survey respondents were full tenants. Other farmers had very small amounts of owned land but had viable farms by renting in both rice and winter vegetable land. The small ownership pattern does not necessarily limit mobility, but clearly larger owner-operators command significantly greater resources to expand operations, weather adverse situations, and generally profit more from growth. There do not appear to be any significant policies or other causal relationships mitigating against widening farm wealth and income differentials. The trend has been in the opposite direction. Although there is little or no evidence of farms currently becoming larger, there is reportedly pressure and serious discussions nationally to lift the three hectare size limit on rice farms--a limit imposed by an effective land reform before the Korean War. Finally, although the agricultural laborers and very small farmers appear to have benefited from higher real wages, it is doubtful, in view of their poor living conditions, that they have increased their income in the same proportion as those with a self-sufficient amount of land.

C. Employment and Demographic Effects

There is no evidence that rice intensification and the expansion of rice acreage have led to greater numbers employed. Instead, there has been a combination of more intensive labor by many of those customarily employed and some mechanization. As in so many countries, concentration on rice and the intensified method of its cultivation have followed the pattern of first, introduction of mechanized land preparation and spraying and then, large amounts of chemical fertilizers. Labor for land preparation, a male function, has declined with the introduction of the power tiller. In 1961 there were 21; in 1979, 235,909. With irrigation, labor for water control has declined sharply, from 25 to 30 days per hectare to 10 days. However, labor for pest control, harvesting, transplanting, threshing, and transportation have risen. Power threshing is widespread. Transplanting and harvesting, unmechanized, are largely female functions. This was observed in the villages. Pesticide spraying labor increased slightly, but it has not offered employment beyond the farm operator or the owner of the sprayer. Thus on-farm male labor has decreased somewhat, but female labor has increased. This has resulted in the relative demand for male and female labor narrowing slightly the difference between men's and women's wages; more so in the more prosperous and, therefore, mechanized villages. But gender-specificity of tasks and rigidity of custom are

probably acting as brakes on a faster narrowing process. In general, agricultural laborers and very small farm operators believe they have benefited from general farming prosperity through higher real wages. But off-farm rural employment in terms of new jobs in the village has not increased significantly. The picture is different in the market towns and county seats.

There has been negligible local creation of new jobs as a result of rising farm income. With the Sae-maul movement undertaking almost all local physical infrastructural and housing improvement (using unpaid labor), these activities have not generated income-gaining employment. Much of the increase in household incomes has been spent on education and consumer durables, employing people from the urban sector. Village retail stores generally expand their business without taking on extra employees. There is no evidence that the Sae-maul movement, which aims at reinforcing and encouraging rural economic expansion, has been interested in capitalizing on higher rural purchasing power by establishing pertinent small manufacturing and repair shops. Instead, it has built rather large factories competing with or supplementing urban factories, and there are already signs that the industrial recession is hitting them first (see Appendix G).

The gender specificity of cultivation tasks has led to an absolute rise in demand for female labor, and, given the decline in male-typed tasks, a relative rise as well. Women claimed that they felt the greater work burden began 5 to 6 years ago, not only from farm work, but partially as a result of the progressive withdrawal of children from field work to classroom. Considerable evidence was acquired of a pronounced desire to limit family size. In general, better-off women believed two children to be the ideal number, whereas poorer women maintained three or four to be desirable.

Although the rural-urban income differential has narrowed, the farming community believes that material conditions are superior in the cities. Increased incomes have opened higher levels of education and fueled rising expectations, both of which have encouraged the continuation, or even acceleration, of the out-migration of young people with theapproval of, and financing by, their parents. At the other end of the inc me spectrum, the very poor see few opportunities for advancement and are, therefore, also keen to see their children leave.

Continued out-migration and falling birth rates together raise the question of the aging of farmers and the future of the present farm size distribution and its family base. Many farmers and their wives believed they were the last generation in their families to farm. Others hoped that one son would remain.

Commenting on the 1970s, a Harvard study of Korean rural development noted the "rapid shrinking of the young adult work force in farm households" and "the higher labor force participation among older men and middle-aged and older women.[3] There was abundant verbal evidence in the

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[3]Studies in the Modernization to the Republic of Korea 1945-75, Rural Development. Council of East Asian Studies. Cambridge, Harvard University Press, 1980, p. 356.

project areas that this process is continuing apace, and that "only the old people will be left to farm". Although real rural incomes have increased greatly, official data indicate that urban real wages are still rising faster than rural real wages. More importantly, both the poor and wealthier rural population believe they would be materially better off in the cities. The fact that sons are somewhat favored over daughters in educational opportunities and the male rural wage market has probably contracted are good reasons to expect more young men than young women to migrate. But there is little to keep young women in rural areas. If they are poor, they are probably working harder in the fields than before. Their domestic drudgery remains unaltered by education or television. The land reform was for men only, and women's participation in farmers' cooperatives and FLIA meetings is virtually zero. As in other countries, while rural men may migrate with rising expectations, rural women, in addition to this, are fleeing constant work and rural patriarchy.

This heavy migration raises questions about the future agrarian structure. The Harvard study noted that migration up to the 1960s (mostly uneducated young) was a brake on farm subdivision after inheritance. The larger farm tended to increase in size and to have younger operators while the very smallest holdings were operated by an increased proportion of people 65 years and older.[4] Farm size distribution and farm operator status may alter. First, children from the larger farms are much better educated now than a decade ago and few may wish to actually operate their inheritance. Second, the industrial recession is already sending young people back to rural areas. If this continues for any length of time, job candidates' levels of education may increasingly be used as a device for allocating urban jobs, so that the poorly educated rural migrants will return in disproportionate numbers to the countryside. Several people interviewed believed poor families will stay on the land. If the migrants view their land inheritance as a moderately yielding, gilt-edged investment underpinning their uncertain urban sojourn, they may settle for renting their land to the remaining poor at rates viable to the poor. If they are optimistic about urban economic growth and appalled at the thought of returning to a rural background, they may sell their land inheritance, most likely to other richer farmers.

D. Welfare and Participation

The project has undoubtedly contributed to rising household income in real terms. Longer periods of schooling, more frequent consumption of meat, and the recent acquisition of radios, televisions, rice cookers, and electric fans were regarded as indicators of improved conditions of life. However, from a basic needs viewpoint the present pattern of increased expenditure appears uneven. Education is the first priority, while nutrition appears to be the last. In particular, weaning foods do not appear to have changed from the traditional introduction of rice soup at eight months of age even in the most prosperous families. There was evidence that female agricultural laborers and women from very small farms practice breast-feeding least because of their need to work in the fields. The decline in the use of child labor in the fields and the intensified annual load of women's work in transplanting and harvesting have meant

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[4]Ibid., pp. 364 and 380.

that the advances in education and the acquisition of consumer durables have been accompanied by additional work for women. In some villages this was partly redressed by the recent introduction of pump water for domestic use and new washing points.

Farmers have made substantial contributions, in labor and cash, to infrastructural improvements in the village but have little power or authority. In spite of their (partial) attendance at meetings of the farmers' cooperatives and the local FLIA, their participation does not extend to decision-making on priorities or planning. The FLIA is not, as the project paper stated, a "cooperative". It is a bureaucratic entity designed to deliver water and collect water fees. It is non-participatory. There has been little mobilization of villagers' requests for specific projects, and what has been implemented appears to have been initiated via a form of "commandism" from a level higher than the village. The democratic process of decision-making on the allocation of village resources is weak. Although the funds of women's clubs have sometimes been used to subsidize construction efforts through their provision of meals for male workers, these clubs appear less active than before and are poorly integrated into other village institutions. With no direct representation in the farmers' cooperatives or the local FLIA, and without being direct recipients of training and extension services, women's social participation is negligible. Welfare improvements from higher incomes have largely by-passed women, who also tend to work harder in the paddy fields. This accords with the private goals of investing not so much in the immediate satisfaction of basic needs but in removing the next generation from the countryside.

Rural Korea is a clear example that income gains need not go hand in hand with civic development. The role of the farmers was to attend, if they wished, FLIA and farmers' cooperatives meetings to receive information and instructions. There was nothing said during interviews in favor of village community life to counteract the powerful force of using agricultural prosperity as a springboard to better things in the cities. There is a general mood of private ambitions and urban drift. The Sae-maul movement, can offer construction of housing, water supplies and roads in selected villages, but is not sufficient to offer the rural population a new sense of belonging to their villages. The people still want to leave.

In this respect, the intended end-results of irrigation (and other means to rural higher incomes) and government policy are widely diverging. The only thing that might converge their respective intentions would be a serious industrial recession. Unless this happens, present government rural development policy is creating massive contradictions for the future.

The irrigation associations and government-sponsored farm cooperatives clearly fulfilled their economic functions but social objectives are probably met only rhetorically. Integration of irrigation associations and farming cooperatives exists, but the Sae-maul movement and women's clubs are less well planned. Women's clubs offer no new channel for their potential because of the absence of village level horizontal links. Instead of offering the clubs support for developmental activities, the

Sae-maul movement absorbed some of their funds by imposing an extension of women's traditional domestic duties--feeding the construction workers.

The environmental impact of the project itself was generally positive as it has in some cases improved drainage and, when coupled with extensive reforestation, reduced siltation. However, it is sometimes overshadowed by non-project factors that impinge upon the project. In one area (Mangyung-kang, North Cholla), industrial pollution of a major stream has been so intense that at certain periods of the year, water cannot be used for irrigation. This did not seem to be in the specific project area, but rather in the overall basin development of which the A.I.D.-supported sub-project was a very small part.

Of more general concern, if less visible and as yet unmeasured, is the vast increase in the use of pesticides and fertilizer on the quality of irrigation water, and thus, perhaps, on people's lives. Pesticide use has risen from 5.6 million kilograms (kg.) in 1961 to 62.6 million kg. in 1974; fertilizer use was 151.7 kg. per hectare in 1961, growing to 395.7 kg. in 1975. Irrigation water is often the source for washing by family members, and drinking water is often piped from reservoirs that are also not free from these chemicals--their health implications deserve serious study by the Korean government.

E. Replicability of the Irrigation Systems

The replicability of the irrigation systems for Korea is not at issue, for virtually 100 percent of paddy is irrigated to some degree. If this were not the case, additional systems in more marginal areas would probably be uneconomic. Of importance, however, is the development of similar systems for other societies. The Korean success has been dependent on a multitude of factors, the complexity of which may make the Korean experience less adaptable to most other developing countries, at least until they can commit signficant resources to rural growth beyond just irrigation infrastructure. These factors included extensive managerial and engineering capacities, the high support price for rice, and a previous heavy investment in rural roads that makes relatively areas responsive to the demand for urban foodstuffs. These needs cast doubt on the Korean model's replicability, unless rural participation and consideration of women's special needs are included in project design. This would increase costs signficantly.

Sustaining the present systems under existing conditions seems reasonably well-assured. Farmers could pay for the use of the water and the amortization of the system even without the 70 percent government subsidy in their construction. This sustainability for small farms is heavily dependent upon the continuation of a high support price. If this is reduced, then the average size farm and those that are smaller may have to alter their cropping patterns and turn to vegetables or other crops, a move that is currently illegal without government approval.

In the longer term, the massive migration of young, better-educated people will affect the size of the rural work force and the agrarian structure. What this may mean for the future of the small farm is speculative. A lengthy and deep industrial recession would likely call into question the continuation of the present high rice-support policy. Sustaining these systems is thus dependent on macro-economic factors over which farmers and foreign donors alike will have little, if any, influence.

IV. LESSONS LEARNED

1. More attention should be paid to overall economic trends and collecting better base-line data in project design. This would have led to more realistic expectations of project results. To speed approval, analysis is often included early in project implementation, rather than in project design. This may lead to false expectations. The careful baseline data that were built into the project after approval should have been done before approval. Had the latest data on rice imports and production been reviewed during project design, the goal of minimizing rice imports might have been changed to a more realistic one of maintaining rice self-sufficiency. Had data been available on the relative profitability of rice and barley production and an analysis made of changing wheat imports and consumption, the goals of promoting barley production and national self-sufficiency might have been abandoned. A better appraisal of the potential project also required more information on irrigation techniques, expected yields, realistic net incremental income targets on small farms, potential cropping patterns, and participation.

2. The overall success of this project was dependent in large part on the proven capacity of Korean governmental institutions to design, supervise, and staff the sub-projects. The Agricultural Development Corporation and the irrigation offices at all levels have exhibited a remarkable capability to monitor the design, construction, and operation of these systems. The project required no outside technical assistance, and none was provided.

3. The project may have succeeded because it was focused on a single element--irrigation--but equally because other coordinating elements were in place. Project design was simply conceived as irrigation alone, and thus administration was focused on a single institution. This allowed a clear chain of command to implement the project. As important as this focus was, the necessary supplementary and supportive elements of price incentives, extension, credit, storage, transportation and marketing were, fortuitously, present. Without them, it is very doubtful whether irrigation alone would have proved profitable. Water control and its management is a major objective of many countries, but we doubt its general effectiveness as a single-factor approach.

4. Where irrigation is added to already effective and existing farming systems--such as converting rain-fed paddy to irrigated paddy--trading on a type of sunk cost, small and medium-scale irrigation can be an economic endeavor. In the Korean case, with its high rice price support policy, it appears the farmers could pay operational and maintenance, as well as capital, costs. Farming and irrigation systems are sensitive to input and product prices, to capital costs of development and to the ability of engineers, maintenance staff, and farmers to construct and actually operate the systems. It is dangerous to assume, as is often the case, that the parts will nicely fall together. Product prices relative to development costs throw serious doubt on the economics of new land development such as swamplands or tidelands. There are no sunk capital costs in these cases on which to rest the project. Assuming the basic undertaking has long-run potential, and if a nation is concerned about developing land and farms, a country, and the world investment community, may very well have to accept a low rate of return for social, political, or other reasons.

5. There is a need to review alternative agricultural technologies. Very high yields are needed to sustain the investment in irrigation systems and to attain reasonable farm incomes. Korea has had high-yielding Japonica rice varieties for decades, but recently has bred somewhat higher-yielding varieties (HYV). However, some statistics show that under good management, the best of the older varieties yield very close to the new HYVs. Farmers were concerned about the greater levels of inputs needed for the HYVs. To obtain similar yields, the older varieties would probably require similar levels of inputs, but the HYVs are somewhat more susceptible to disease, particularly neck blast. Korea has a vigorous research program to determine the agronomic and economic issues at stake. Farmers should be made aware of the various alternatives so they fully understand the potential risks and gains from each production strategy.

6. Even in Korea, which had a successful land reform program, there is a conflict between national production targets and income distribution considerations. Improved income is intimately correlated with farm size. Although there are no large landlords in paddy production, gains from the project are spread unevenly depending upon previous farm size, which in turn is a prime requisite for raising venture capital for agricultural diversification. If programs are designed to share more evenly the fruits of project investment, more graduated water prices or other tax mechanisms should be considered. Women, excluded from land reform, benefited least in equity terms. Land reform alone is not a sufficient condition to ensure equity.

7. Local participation in the Korean project was not a prerequisite of project success. Korean bureaucratic centralism and hierarchical social structures neither allowed farmers nor their wives to participate to any significant degree in the decision-making on project design or execution. Economically successful, the project has not increased the sense of community or developed locally sponsored institutions. Perhaps special-purpose irrigation projects should not be expected to spawn community development.

8. Unless women are positively included in project design considerations, the conditions under which they work can be exacerbated. Women were never mentioned in the project design. Although they have benefited as farm incomes have risen, they have benefited unequally. Labor-saving technology in the fields has benefited men primarily; women are obliged to undertake larger shares of field work as their children leave home for school or urban employment. If projects are not designed to recognize sex specialization of agricultural tasks and patriarchal elements in society, sex inequalities may very likely increase.

9. Any assumption that may have existed that there is a strong correlation between improved income and better family nutritional standards is false in non-subsistence economies. Enhanced income has little impact on nutritional standards of members of the family, and no positive impact on infant nutrition. Instead, rising incomes were universally regarded as a means of upward social and economic mobility directed to the cities through higher education for children. If Korean farmers had been poorer, then perhaps better nutrition might have been perceived as more important. Korean families appear more healthy than in the past.

10. The Korean developmental successes should not obscure emerging developmental problems. The search for production through administrative conformity has set targets that are often fulfilled with little regard for the environmental or human consequences. Serious industrial pollution of water is evident. Directed use of pesticides and herbicides seems excessive, with scant attention to environmental or health considerations other than avoidance of immediate contamination of people. Government quotas force adherence to policies as well as contributions of labor and time that may have long-run benefits for the farmer, but may cause hardship in the short term. Villagers' involvement in local government is non-existent.

V. CONCLUSIONS AND POLICY RECOMMENDATIONS

Rural development in Korea has made great progress. Korean rice farmers are now among the best in the world. Korean 1977 yields of 4.8 metric tons of milled rice per hectare exceeded Japan, Egypt, Taiwan and the U.S. The nation has succeeded in meeting one of the national aggregate grain production goals--rice--but that success has contributed to the failure or irrelevance of barley goals, production of which is still needed for feed, if not food. Korea has eliminated some of the gross inequities of urban and rural income distribution. Irrigation has been one of several important elements in this effort, and the A.I.D. contribution to its expansion, although modest in comparison to the Korean commitment, has been successful. It has followed, not led, the Korean effort.

Rural Korean progress has not been the engine that has pulled past development. Earlier national economic plans emphasized industrialization and export promotion. Only in the past decade has the government attempted to redress the balance between urban and rural Korea. It has done so without local participation in local decision-making, essentially without reference to the female population. It is not a model for other societies.

AID's assistance in Korea will soon end, so policy recommendations emanating from this impact evaluation should be applicable to other development programs. Korea is probably sui generis. Other developing societies lack the extensive infrastructure and development services in rural areas, together with national grain pricing and procurement policies, that allowed this project to succeed. Further investment in medium, or even smaller, size irrigation should be determined by the nature of the nation's rural commitment and institutional capacity as evidenced by its economic policies.

Korea, in economic terms, is no longer a developing country. The irrigation project was proposed and completed when Korea already had an educated population and extensive infrastructure. In fact, the precondition of a successful transfer of funds for irrigation, such as this project, may have been previously successful developmental effort. Korea, at least in the short run, has been able to afford to be autocratic by being efficient.

Even after land reform, and without great rural income disparities, Korea demonstrates that there are direct conflicts between production goals and income distribution targets. This will be even more pronounced in nations where land is more unevenly distributed.

Overall project success in rice production and income improvement was possible in large measure because of the high support price. Korea could import at least 50 percent more rice than it could produce domestically with the same expenditure. There are, however, longer-term considerations for setting aside the short-term international comparative advantages argument. Relations of economic exchange between urban and rural areas are similar to those between "North" and "South" countries. As the Brandt Commission report argues for a substantial transfer of wealth from the North to the South in order to raise incomes in the latter and, in turn, an increased demand for goods from the North, so rural areas may depend on wealth/income transfers from urban areas before they are in a position to purchase more urban goods. In Korea, the rural areas' income elasticity of demand for urban goods and services has already shown itself to be very high, hence setting up an internal growth pattern.

Irrigation projects alone should not necessarily be considered an unrestricted good. Preparation of such projects in other societies may require greater attention to national and local administrative capacity and delivery of supporting services. The social aspects of project development, including migration, employment, and the effect on women, need greater attention. Irrigation projects can succeed, but they are heavily dependent on related infrastructure and national macro-economic policies, as well as on the farmers' motivation and goals.

The income level of Korea in the late seventies enabled the consumer to pay relatively high prices for rice, which is increasingly a smaller portion of household expenditures. The more typical situation in other countries is where attempts are made to hold down both consumer and farm prices. That policy results in poor farm production and ineffective use and maintenance of irrigation systems. The Korean case of food and farm gate prices may be one that deserves considerable attention if countries are serious about increasing production through irrigation.

APPENDIX A

METHODOLOGY

Methodology

From the meager information available to the team in Washington prior to its departure, there seemed to be four factors that might have had a significant impact on choice of which of the sixty-six project sites the team should visit. These were: size, type of irrigation system, internal rate of return, and location. Location seemed of less importance since Korea is ethnically homogenous and provincial characteristics are residual, having found expression in political factionalism, some economic discrimination in investment priorities, and marriage patterns more than in any other activities. Provincial distribution nevertheless seemed desirable. The internal rate of return had separate problems (see Appendix C), and had been twice calculated by the Mission, although not with standard procedures. Thus, two factors seemed to hold most potential for choosing sites to visit. These were: the size of the project and whether the system was one that used outside energy sources (pumping systems), or one that relied on gravity flow, i.e., reservoir or drainage canal systems. Size seemed important because smaller systems might prove more expensive per hectare served. Pumps required energy, and diesel fuel costs in Korea were very high. There was no way of knowing in advance whether the pumps used were electric or diesel.

The team determined that one of the 66 projects was obviously atypical because of its magnitude. This was the Sin-gog system in Kyunggi Province. It comprised 15,000 hectares, and was almost 30 percent of the total area to be irrigated. Because it was so large, we felt it was necessary to study it.

The remainder of the 65 projects were then divided into groups by three sizes: those up to 300 hectares, from 301 to 799 hectares, and over 800 hectares. This gave a split of 28 small projects, 18 medium-sized and 19 large projects. The choice of size was in part arbitrary, to ensure that all size systems would be visited.

A stratified sample by type of system and size was randomly selected: three irrigation systems that were small and reservoir, three that were small and pump. In the same manner, six medium-size systems were chosen and six large systems, for a total of eighteen, plus the Sin-gog system.

This, then, was the maximum number that could be visited within the time period available; that is, in a period of three weeks in the country. This could mean one system visited on some days, two on others, with the remainder for travel time. In case a smaller number had to be chosen, the team initially felt that twelve should be the minimum (two within each of the six squares of the matrix, e.g., two small pumps, two small reservoirs, etc.).

The mix of nineteen potential projects was, the team felt, a good sampling of project sites. That number represented 29 percent of the projects, and 58.9 percent of the planned hectarage was included.

By chance the selection included both projects with high and low internal and financial rates of return. Eight of the nine provinces of

Korea have project sites (the exception was the island of Cheju). Of eight provinces, sites were randomly selected in seven provinces. Some were clearly very isolated, and others were relatively close to major cities. Two sites were on very remote islands of the extreme northwest and southwest coasts, and the team withheld judgment whether they could be visited within the time limits set by the evaluation. Some systems were in areas known to be traditional in outlook; others clearly close to a center of industrial growth.

The question was raised whether any sites could not meet payments on the irrigation system; if so, a determination would be made after consultation in Seoul whether these should be included. Initially Seoul was not informed in advance as to the site selections. It was hoped that some of the sites chosen would be correlated with those for which economic and social baseline data were available. The new road system made it possible to reach the southern extremity of Korea in five hours, where it had once taken over twelve hours; so all sites, except those on the islands, were within one day's travel of Seoul. Final choice would be made after consultations in Seoul.

On arrival on Seoul, it was apparent after examining the files that the team had lacked critical information on the sub-projects as eventually agreed between the U.S. and Korean governments. First, two projects had been excluded from the agreement signed September 11, 1974, and the amendments signed April 30, 1975 and September 13, 1975. Two others were substituted. Then eleven projects were eliminated from AID reimbursement as funds were insufficient to cover all planned projects. Five of these were included in the team's initial list. Thus, there were fifty-five sub-projects completed with A.I.D. funds from which site visits were to be chosen. No projects were behind in repayments, or had other problems, thus eliminating one potential modification of site selection.

The random sample method was continued for all AID funded sub-projects, and a total of eighteen projects chosen, excluding the islands (time would not permit the visit in the extreme southwest, and the island in the northwest is located at the demilitarized zone, separated from North Korea by a small estuary, and would require special military permission to visit.) In this sample there was breadth of types of projects and internal rate of return (both high and low), and seven of the eight provinces were represented. Although seven of the eighteen projects sites picked were in South Kyungsang Province (37 percent), 30 percent of all approved sites were in the same province.

These eighteen sites totalled 12,145 hectares planned for irrigation, or 45 percent of all 55 sub-project hectarage, and included one third of all sub-projects. The team was able to visit fifteen* sites (27.3 percent) representing 38 percent of total hectarage irrigated. Revised

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*Through misinformation supplied at the local gun office, one site was visited that was in the major irrigation development area but was not the specific site attributed to AID funding.

planned site visits and actual field work locations are included as Appendix B. Chinese characters for all sites and locations are in Appendix J.

The team had envisaged reservoir systems as small catchment dams at the heads of valleys from which water flowed by gravity into the paddy fields. Such systems are ubiquitous throughout Korea.

As the team visited project sites, it was apparent that the initial division into surface (reservoir) and pumping systems was not accurate. A pumping system, for example, might include pumping to a reservoir, and drainage systems might employ pumps both for drainage and irrigation. Only three simple gravity-flow systems were found in the sample.

The team drove a total of some 2,300 kilometers throughout the country to visit 15 sites. Some sites, such as the North Cholla Province Man-Kyung Gang extension, were almost within urban city limits. Others, such as Se-do on South Chungchong Province, were over 35 kilometers from a paved road on a rough dirt track, isolated geographically but tied to urban areas by a sophisticated vegetable marketing system organized entirely by the farmers themselves. The general pattern was for the three foreign members of the team together with their Korean counterparts to visit the gun (county) or myon (township) irrigation office to get generalized statistics on the project. These included: planned and actual hectarage covered; total planned and actual costs of construction and dates of initiation and completion of the project, water fees charged farms, crop yields before and after the project, number of beneficiary households and average farm size; relation of the project to other irrigation efforts in the same locality; details of equipment, canal, etc.; and performance of the equipment. The team then visited the project site, splitting into three groups of two each (a Korean and a foreigner), and separately visiting fields or village houses to talk individually or in groups to farmers or their wives. Discussions were held with perhaps one hundred farmers and their wives. A special point was made to seek out women, and a female interpreter was added to the group to assist in this effort. The team then met together at the close of each site visit to discuss their findings. There seemed to be a remarkable degree of consistency in the observations of the team members with some relatively minor deviations in figures.

In addition to the site visits, AID had sponsored a separate social survey of 16 of the original 66 project sites that were to be funded by AID. This survey, by the Korea Rural Economics Institute under the direction of Dr. Kim Dong-il, was carried out prior to the arrival of the team. After the site visits were completed, the results of that survey were discussed with the team, and some of the findings are included in Appendix E of this report. A full analysis of the study will be published separately at a later date.

The social survey by the Korea Rural Economics Institue of 16 sites was designed to supplement the economic surveys done by the same institute in cooperation with professor Richard Duvick of Ohio State University. The base line data of these latter surveys was collected in 1975, and the

same areas will be resurveyed by the Duvick-KREI team during the harvest of 1980 (October-November). These results wil also be published at a later date.

These four efforts, the social survey of 16 AID sites, the two time-phased economic surveys five years apart, and this impact evaluation will provide considerable material that will help in analyzing the growth of Korea's rural economy.

In addition to these studies, Dr. Martin E. Hanratty of Michigan State University published a monograph, "A Post-Project Economic Evaluation of Selected Small and Medium Scale Land and Water Development Projects Funded by USAID in Korea" (Ministry of Agriculture and Fisheries, Seoul: December 1976). An analysis has also been done of IBRD projects (see Appendix H). Small and medium scale irrigation in Korea has been well studied.

APPENDIX B

REVISED SITE SELECTION: KOREAN IRRIGATION SYSTEMS

Revised Site Selection :
Korean Irrigation Systems
(By Province)

Project Paper No.	Province	Name	Planned Hectares	FRR	System Type	Team Visits Dates
	Kyunggi Province					
21	8	Gun-am	288	23%	Pump	7/2
66	10	Goong-pyong	210	18%	Pump	7/3
56	11	Yeo-ju	180	27%	Pump	7/14
	North Chungchong Province					
25	1	Keum-dong	883	26%	Pump	7/4
	South Chungchong Province					
19	9	Se-do	317	24%	Pump	7/11
	North Cholla Province					
37	5	Do-song	78	22%	Reservoir	7/10
24	6	Man-kyung-gang	2,099	39%	Surface	7/10
	South Cholla Province					
59	8	Song-weol	70	19%	Reservoir	
30	10	Ku-mon	516	24%	Reservoir	7/9
	North Kyungsang Province					
53	18	San-nam	320	17%	Pump	7/5
28	1	Mae-ho	546	26%	Pump	7/5
	South Kyungsang Province					
14	1	Myung Kwan	268	26%	Reservoir	7/8
2	10	Yoon-nae	650	77%	Drainage	7/8
11	17	Jang-yoo	1,377	24%	Pump	7/7
1	9	Ha-gi	553	56%	Surface	
3	6	Chang-woon	1,832	67%	Surface	7/7
38	2	Ha-nam	818	26%	Surface	7/7
9	14	Cho-gye	1,140	26%	Pump	

Korea Irrigation Systems
(Planned Hectarage)

Type	Project Paper No.	Name	Province	Hectare	FRR*
Small (to 300 hectares)					
Surface	** 14	Myong-Kwan	South Kyungsang	268	26%
	** 37	Do-Bong	North Cholla	78	22%
	59	Seong-Weol	South Cholla	70	19%
Pump	** 66	Goong-Pyong	Kyungki	210	18%
	** 56	Yeo-Ju	Kyungki	180	27%
	** 21	Gun-Am	Kyungki	288	23%
Medium (301 - 799 hectares)					
Surface	** 2	Yoon Nae	South Kyungsang	650	77%
	** 30	Ku-Man	South Cholla	56	24%
	1	Ha-gi	South Kyungsang	553	56%
Pump	** 53	San-Nam	North Kyungsang	320	17%
	** 19	Se-Do	South Chungchong	317	24%
	** 28	Mae-ho	North Kyungsang	546	26%
Large (800 - up hectares)					
Surface	** 3	Chang-Woon	South Kyungsang	1832	67%
	** 38	Ha-nam	South Kyungsang	818	26%
	** 24	Man-Kyung-gang	North Cholla	2,099	39%
Pump	** 11	Jang Yoo	South Kyungsang	1,377	24%
	** 25	Keum-Dong	North Chungchong	883	26%
	9	Cho-gye	South Kyungsang	1,140	26%

* Financial Rate of Return (from Project Paper)
** Actual Site Visits

APPENDIX C

I. TYPES OF IRRIGATION SYSTEMS
II. ECONOMICS OF THE IRRIGATION AND FARMING SYSTEM
III. FARM LAND IMPROVEMENT ASSOCIATIONS
IV. KOREAN LAND-LEASING SYSTEM

by

Robert B. Morrow

I. The Types of Irrigation Systems

Although the command areas of the irrigation systems are not large in comparison to major river basin or desert reclamation projects, they nevertheless require good management because many of the systems have fairly large-sized electric and diesel-driven pumps and often use systems reflows. They have up to 540 horsepower (hp) diesel and 500 hp electric motors with pump-capacity of from 1 to 4 cubic meters per second. The 55 projects A.I.D. financed ranged in size of from 70 to 2092 hectares in actual benefited area. The sample projects visited were from 75 to 1832 hectares in size. There are basically four types of systems; (1) storage dams with gravity flow to the rice paddies; (2) river irrigation pumps; (3) irrigation and drainage combination systems and, (4) pumping from rivers to reservoirs and gravity flow to paddies. These systems are described below (see Table 1 for the sample list and cost of systems):

A. Storage Reservoirs

The survey team visited three of the gravity-fed systems, one medium-sized dam and two small ones. There were 32 of these dams built and they ranged in size from 6.6 to 33 meters in height to 90 to 1960 meters long. The surface reservoirs were from 6 to 334 hectares. The command areas were from 560 to 70 hectares. Of the three sites visited, all were operating effectively. At Myung Kwan the people mentioned an inadequate spillway capacity during the 1979 typhoon, but whatever damage may had been done to the dam or paddy fields near the dam had been repaired. The area in the upper reaches of the project had converted upland to paddy, the lower reaches were, and still are, the better irrigated areas as it takes considerable time to develop upland farming areas to good paddy land.

In 1974 the construction costs of these dams were quite low. The Ku-nam dam has a very large concrete spillway and the water release gate house is well back in the reservoir.

The average costs--in 1974 terms--was only $1900 per hectare to build the dam and to put in the irrigation system; the costs today would be much higher. Although the IBRD has found this type of irrigation system currently to show poor rates of return due to high construction costs and long lead times to complete the system, their lower operating costs might still make them attractive in countries with good sites and where earth dam construction may still be done cheaply.

B. Pumping Stations

The second type of system visited were pumping stations wherein water was pumped directly from rivers or from feeder canals supplied from rivers. The water was either pumped directly to a main canal or into large concrete flumes--often raised some 10 meters or more over ravines and which continued alongside hills until the conveyer reached the paddy fields. The team visited six of these systems. They were either all working well at the time of our visit or were reported as functioning all

right. One village at the end of the system reported some water shortages. The system operator said he was expecting rain, and in any event a large transformer was being replaced at the time of the visit. It is quite possible that these systems do find some difficulty in always pleasing everyone at all times. In another village, the farmer complained of too much water, as the FLIA had pumped the day before and that night there was a heavy rain. It would be extremely doubtful if one could optimize use of energy and maximize irrigation requirements as the operators would need to have accurate rainfall predictions which simply aren't available.

C. Irrigation and Drainage Systems

The combination irrigation and drainage systems are primarily drainage systems, and one, Ha-nam, was essentially a set of drainage pumps which reclaimed 173 hp of swampland. The pumps are at the end of an area, which is usually a diked-off portion of a river flood plain. The main pumps, and smaller auxiliary pumps, are designed to discharge either to the river or a drainage canal. The pumps are also designed to discharge to irrigation canals, which begin on the high side of the river control dikes, and slope back to the head of the benefited area. In this manner drain water is recycled to re-irrigate the dry paddy fields as there is usually excess water in the overall system. Korea is fortunate that the source of water is rain and there is no salt pick-up from the paddy fields. These systems are ingenious and the rice growing areas clearly receive marked benefits from both the drainage and irrigation combination. The systems visited were all in very good shape.

The fourth system visited comprised a means to overcome a major problem which occurs when irrigation is done from the run-of-the-river systems, i.e., systems are dependent upon whatever the current river flows happen to be. The problem occurs because at the same time the paddy fields dry up--so does the river. The solution, albeit a relatively expensive one, is to construct a reservoir and fill it while there is adequate river water and release it as needed. The team visited two of these systems. One was a reservoir in the hills above the paddy fields which required a high water lift and a long concrete flume of a 1000 meter to the reservoir. The costs per hectare of this particular system, San-Nam, ran at least double other systems and showed a low return because of capital costs and the rather low incremental yield increase. The area was fairly good rainfed and partially irrigated paddy even before the project. Marked benefits occured on 54 out of 320 hectares which were converted from upland to paddy. The second pump/reservoir system was at an old tideland reclamation site, Gun-am, which was never productive from using small run-of-the-river pumps.

A portion of paddy land was diked off to make a reservoir and this is filled and released to irrigate fully and control sea water intrusion of the paddy area. Because the water lift is low and the pump is directly at the reservoir, both capital costs and operational costs are relatively low compared to the San-Nam site. Both systems were working well and the effective irrigation system for Gum-am was in the low range of unit costs per hectare--$1,753/hectare versus $4,578 for San-Nam.

Although not entirely without problems (three electric motors were mounted improperly and "vibrated" to death in five years versus an expected 25-30 year life expectancy) the systems visited were apparently of good design, well constructed, well maintained and properly operated. The farmers, the FLIA and the Agricultural Development Corporation are to be congratulated.

No assessment, per se, was made of the on-farm water management aspect of the irrigation systems. Such assessment was implicitly included in the overall farm management and production system. With Korean rice yields among the highest in the world and equal to or exceeding those of many experiment stations it implies that most management functions are well done. This is not to say that improvements in water and other efficiencies cannot be achieved, but there are no glaring inefficiencies.

II. Economics of the Irrigation and Farming System

There are several measures by which one can estimate the viability of an investment to the economy as a whole and to participating farmers.

The Korea irrigation project paper prepared by USAID/Korea used two IRR measures for each irrigation area (sub-project): an incremental IRR and a financial IRR. The paper does not present an economic IRR which is in many respects the most interesting of the various IRR's, at least to the developmental community.

The calculation of an incremental IRR simply ignores sunk costs in the sub-projects, all of which had some construction started. Naturally the incremental IRR, or return on the remaining investment, is high since it attributes nothing to the initial investments and, in effect, all returns are to the final tranche of money. This measure may be of interest to a finance minister in that it tells him to finish off partially completed projects before starting new ones. It doesn't tell him whether the project should have been started in the first place or even whether he should cut potential losses and abandon the project. For those decisions one needs economic analysis and financial analysis.

The project paper provides financial analysis which uses 1974 prices for costs of production, costs of construction, and costs for operation and maintenance of the irrigation systems. It used projected prices for rice and barley. The calculated financial IRR's show a respectable return and indicate the total project to be financially sound for participating farmers, for the Farmland Improvement Associations, and for the central government which provided the bulk of the capital for each of the respective sub-projects which collectively constitute the total project.

The calculation of the economic IRR was not done. This is now standard practice for A.I.D. projects as such calculations use international values for items which are traded internationally and full (unsubsidized) values for local costs items. Such calculations provide planners and

development agencies with uniform standards whereby they may be better able to choose among projects. If these calculations had been done in the particular case of Korean small-scale irrigation, they would tell whether the government may have been better advised to import cereals and use investment funds for industrialization projects that may have higher IRR's and employment generation effects.

The financial IRR used a projected rice price of $355/mt in the 1974 calculations. As it turns out, the price of rice, landed in Korea, in the past few years (1972-1979) has been about just at $360 so the financial, projected price and real price for the main item of benefits turned out to be rather amazingly close.

A recent study by the Korean Rural Economics Institute computed financial and economic IRR's in IBRD-assisted small-scale irrigation projects which are similar to the ones A.I.D. financed (Oh, Ho Sung). This study found economic IRR's of 16.6 percent using domestic prices and 12.4 percent using international prices, thus the financial IRR's indicated about a 25 percent overestimate from economic IRR's. It appears the financial IRR may overstate the economic viability of the project somewhat, but even so the projects are economic by both domestic and international measures.

The sensitivity analysis provided in the project paper provides insights into different pricing and cost scenarios but it would have greatly enhanced decision making regarding project approvals had economic analysis been done in the first instance. Such analysis, in the project design stage, would also be very useful for project evaluation purposes.

In addition to the evaluation by Dr. Oh (Oh, 1979) of the ROKG/IBRD-financed small- and medium-scale irrigation projects, Dr. Martin E. Hanratty (Michigan State University formerly with the A.I.D.-financed Korean Agricultural Assistance Planning Project) analyzed some of the 55 ROKG/A.I.D. Irrigation Projects. His study took place in 1976. Two of Hanratty's sites, Gun-am and Do-bong were visited by the AID/W Impact Evaluation Study Team. Hanratty's economic IRR's ranged from 8.56 to 19.39 at international prices and from 13.21 to 29.48 at domestic prices. The survey team found Gun-am and Do-bong to have the same relative standing as Hanratty did with respect to apparent viability. The impact team did not attempt to recalculate IRR's because one needs construction costs and schedules, operational and maintenance costs plus farm budgets for a lengthy time series and all costs and benefit streams discounted to the present. Most importantly, one would need to know the marginal cost to produce the new increments of rice attributable to a new irrigation system. Neither the data base nor time permitted re-doing the IRR's. Rather, a "rapid rural appraisal" technique of estimating total capital costs recovery was used to obtain an approximation of whether the farming system could have sustained the original investments in the irrigation improvements. The estimate was made using assumptions that the farmers took out a loan covering the total investment costs of their particular system at 25 years to amortize pumps and 30 years to amortize dams. The rate of interests was assumed to be 12 percent. The annual payment was calculated in terms of metric tons of rice at domestic prices and at international prices. Table 1 shows how much of farmers' new

production--from the irrigation systems and associated inputs--would be needed to repay the 100 percent capital cost loan. It also shows how much of the total production, rather than the new increment would have to be used to repay the loan. With the exception of the land reclamation type project, Ha-Nam, and San-Nam (a type of project with a set of pumps, a long flume and a reservoir) it appears farmers should be able to pay the capital costs of their irrigation. They are now paying only 10 percent of capital costs. They pay almost all of the operation and maintenance costs, the exceptions being diesel fuel and electricity which are subsidized. With current high rice price support, full costs could most likely be paid for energy.

At international prices, which are about half of the domestic price level, the percentage of a crop needed to repay the loan about doubles the rice payments amortization, but even when international imput prices as well as output prices are used (Oh, Hanratty), the projects still appear economic.

Oh and Hanratty's positive economic IRR's imply that incremental production comes at low costs and has correspondingly high benefits. This is because almost all fixed and variable costs of raising a crop are embodied in the basic land preparation, planting and fertilization and harvesting operation. Adding the annualized irrigation costs and a little fertilizer and harvesting expenses thus yield a good return, over time. Hence their analyses show that the project is economic to the society.

This is not to imply that capital and other costs could be recovered easily. As a practical matter, actual recovery of capital costs is not attempted because even though costs and returns show new marginal increments of rice are produced very profitably, it is national average costs of production which are used to set support prices and are the figures used throughout the government agencies. The average costs per ton of rice are much higher than are marginal costs implicit in economic analysis of a particular irrigation system. Thus to collect capital and operating costs, the government would have to demonstrate satisfactorily to farmers that their new system was more profitable than all neighboring systems, or raise everyone's water fees substantially, thus reducing real farm income, which is counter to the government's objectives.

In summary, economic analyses by Oh and Hanratty indicate most of the projets are economic, if one accepts a portion of the projects with rather low IRR's--in the 8-10 percent range. Capital cost recovery estimates at the prices prevailing in Korea indicate the projects could amortize all investment costs with the possible exception of a land reclamation project.

TABLE 1

Sample Villages

	Name	Type of Project	Actual Benefited Area (Ha) Total	Conversion to Paddy (Approx)	Cost/Ha	Yield Increase Mt/Ha, Farmers Est. Before	After	Yield Increment
1.	Gun-Am	Pump and Reservoir to irrigate effectively a tideland reclamation area	288	-	$1,753	1.5	4.8	3.3
2.	Yeo-Ju	Pump to irrigate rainfed upland and rainfed paddy	210	42	2,071	2.5	4.2	1.7
3.	Ext.Keum-Dong	Pump irrigation for rainfed paddy and convert upland to paddy	661	200	2,303	2.4	4.6	2.2
4.	San-Nam	Pump and long flume to reservoir	320	54	4,578	3.6	4.8	1.2
5.	Mae-Ho	Pump to concrete flume direct to paddy land formerly upland or poor rainfed paddy	570	100	2,257	1	3.3	2.3
6.	Ha-Nam	Drain and irrigate swampland via pumping-reclamation project	173	150	9,250	4.8	5.1	new land
7.	Chang-Woon	Drainage/Irrigation Pumping	1,832	-	1,675	3.6	5.0	1.4
8.	Jang-Yoo	Pumping direct to paddy from long intake canal some rainfed paddy	1,376	-	2,009	1.5	3.7	2.2
9.	Yoon-Nae	Replace pumphouse and 400 h.p. irr/drain engine and pump	650	-	842	3.2	5.0	1.8
10.	Myung-Kwan	Gravity irrigation from dam-lower reacher were partially irrigated	268	140	2,173	Lower area 3.0 upper area 1.2	4.8 2.6	1.8 1.4
11.	Ku-Nam	Gravity irrigation fro dam-rainfed paddy prior to irr.	516	50	1,900	2.4	4.8	2.4
12.	Do-Bong	Two small dams irr 50 & 25 ha rainfed paddy prior	75	37	2,466	3.6	4.8	1.2
13.	Se-Do	Pumping direct to main canal reclaimed flood plain, some rainfed paddy	218	100	1,592	2.0	4.0	2.2
14.	Yeo-Su	2 staged pumping to former rainfed paddy	127	-	2,514	1.9	4.0	2.1
		Totals Overages	7,294	873	2,670	2.4	4.4	2.0

TABLE 2

Estimate of The Farming System's Capability to Repay The Irrigation Investment
Units in Mt/Ha

	Name	Type	Production Increase after Project (Mt/Ha)	Total Production (Mt/Ha)	Domestic Prices, 1979 MT of Rice/Ha to Repay 100% Costs	Domestic Prices, 1979 % of Incremental Production	% of Total Production
1.	Gun-Am	Pump & Reservoir	3.3	4.8	.30	9%	6%
2.	Yeo-Ju	River Pump	1.7	4.2	.25	15%	6%
3.	Keum-Dong	"	2.2	4.6	.30	14%	7%
4.	San-Nam	Pump & Reservoir	1.2	4.8	.80	66%	17%
5.	Mae-Ho	Pump	2.3	3.3	.39	17%	12%
6.	Ha-Nam	Drain/Irr. Pump Land Reclamation	No prior rice	4.6	1.6	No prior crops	35%
7.	Chang-Woon	Drain/Irr. Pump	1.4	5.0	.29	21%	6%
8.	Jang-Yoo	Irr. Pump	2.2	3.7	.35	16%	9%
9.	Yoon-Nae	Drain/Irr. Pump	1.8	5.0	.15	8%	3%
10.	Myung-Kwan	Dam	1.6	3.6	.35	22%	10%
11.	Ku-Nam	Dam	2.4	4.8	.30	12%	6%
12.	Do-Bong	Dam	1.2	4.8	.40	33%	8%
13.	Se-Do	Irr. Pump	2.0	4.0	.28	14%	7%
14.	Yeo-Su	2 Staged Pump	2.1	4.0	.48	23%	12%

III. The Farmland Improvement Associations

For the small- and medium-scale systems the county level Farm Land Improvement Associations (FLIA) accept full responsibility for operation and maintenance of the systems. They collect funds--through a farmer membership fee--for the administration, depreciation, education/demonstration, contingency and operation and maintenance connected with the system. The FLIAs all have massive records on their systems and they have an annual balance sheet which breaks income and expenses down by source and use. The income is usually about 80 percent from membership (water) fees and about 16 percent from interest earnings on the depreciation funds, the balance, 3 or 4 percent, is from the central government, unless major new construction is underway, in which case the ROKG contribution would be bigger. The expenditure pattern is usually about 40 percent for operation and maintenance, 25 percent for administration and salaries of water tenders, 10 percent for loan repayments, with the balance spread among education/demonstration, contingencies, and savings (depreciation). The membership fees are about $215 per hectare, about four times the national average, as apparently the old national systems are very efficient on both capital and operating costs or are being more heavily subsidized than are the systems under study. The subsidy comes through the government's recovering only 10 percent of capital costs and only a portion--maybe half--of energy costs. Even so the range of water changes, $144 to $294 per hectare, are high by world standards and are sustainable by the high rice price. If farms were large, and net farm income therefore substantial, the systems could probably pay all capital, operation, and maintenance charges under the Korean price policy. However because of the small size of the farm and correspondingly the small absolute net income per farm, the government simply chooses to underwrite a portion of the costs of the systems--as does the United States for even very large farms.

On balance the FLIAs and the farmers are doing a very good job in operating the systems, in paying water charges and general management of their collective responsibilities.

IV. Land Leasing Arrangements

Land leasing arrangements being the result of the interaction of land availability and the number of people wanting to farm, costs of production, and commodity pricing are indicators of the profitability of farming. In Korea it now appears that returns to land ownership are very favorable, and even renting in land at seemingly steep rents seems profitable.

One of the team's first inquiries about rents revealed a situation in which the respondent said he paid 100 percent of the rice to the landowner and the farmer furnished all inputs. Since this was an obviously impossible situation, we probed. It turned out that the farmer then received the use of the rice land, rent free, for winter vinyl crop production. It was further revealed that the rent was a fixed rent, in kind, of about 3.6 mt of rice per hectare or about three fourths of expected production, still a substantial rent for rice land.

The usual rent is one half of the actual production with the farmer furnishing all inputs. Occasionally the landowner may pay one half the water charges. In many terms, at domestic prices, this turns out to be very interesting if one owned significant rice lands. The government's 1978 rice price of $792 mt is apparently calculated using 1978 cost of production figures of $552 a metric ton plus a profit margin figure of $240. (The 1979 figures of $762/mt are a little less using a slightly less favorable rate of exchange.) The costs of production are calculated with about one half going for labor and out-of-pocket costs of seed, fertilizers, pest control, fuel, and machinery depreciation, and one half going for returns to land and capital. The rental system of 50/50 thus gives a return to land of about $396/ha, and $396 to the farmer to cover his $276 out-of-pocket costs and a $120 return to his labor. The practice of setting support prices which cover all costs and with a return for land and labor plus a profit margin makes Korean farmers the envy of U.S. farmers whose target price programs use cost of production etimates but without a similar return to land or similar profit margins. Rice lands in Mississippi rented for only $125/ha in 1979 versus an implied $397 rent in Korea. Although the two countries cost/price structures and farming systems are very different, it is clear the Korean government has an effective income transfer mechanism in place for rice land owners via the high rice price policy.

APPENDIX D

NOTES ON CHANGES IN THE ROLE OF WOMEN AND IN FAMILY WELFARE

by

Ingrid Palmer

Notes on Changes in the Role of Women and in Family Welfare

Women in the villages of Korea cannot be compared with their counterparts in third world countries. Their physical appearance is good: there are no signs of calorie deficiency or marked premature aging and they do not have an exhausted, haggard look about them. Nor do they appear to be constantly working. The evaluation was admittedly undertaken during a relatively slack labour period when many women were sitting around talking, with some of them complaining of lack of wage employment. The nearest health center is usually 4 to 10 kilometers away and its services, notably those of family planning, well known to all the women.

The main areas of concern about women's position as the countryside undergoes transition lie in discriminatory agricultural labor and in access to decision-making. The drive towards children's education, material acquisition and upward social mobility allow men's and women's interests to coincide at many points, but they also mask the unquestionable family patriarchy and women's unequal position in decision-making on the allocation of resources. Undertones of Confucian influence still pervade and are likely to be invoked if there is a clear conflict between men's and women's interest.

The intensification of rice cultivation following irrigation obliges greater care on some field tasks and allows mechanization of others to be profitable. As has been observed in other countries, the typically female-typed jobs of transplanting and weeding require more effort, although herbicides are rapidly taking over the job of labor in the latter. But the male-typed task of land preparation is now widely undertaken by power tillers which are also used for transportation. Pesticide spraying is a new cultivation task which, requiring a piece of machinery, has been appropriated by men in the usual manner. But it is a solitary task and so does not require a massed labor force like transplanting.

The decline in the demand for male labor appears to be clearly greater than the decline in the supply of male labor through the greater attendance of boys at school. But several women pointed out that their work has been made harder by more girls going to school. When asked how long ago their agricultural workload started to increase, they mentioned five to six years ago, which coincides with the completion of the irrigation projects. There were some women from the better-off farming families who do little or no work in the fields and their numbers have probably increased with rises in income. There is a measure of exchange labor for transplanting but more often the women organize it on a collective basis and sometimes subtract an amount from their collective wage, which they explained with some pride, goes to the women's club.

The shift in the relative demand for the sexes' labor is narrowing the gap between men's and women's wages a little, but this process is probably slowed by the gender-specifity of the jobs so that the labor market is very differentiated. A common quote was W4,000 a day for men (sometimes with three meals during harvesting) W3,000 for women (with one

meal included). In one prosperous village it was said that both sexes earned W4,000 a day for transplanting, but since this is almost entirely women's work some caution is needed in interpreting this. More significant is that the same wage was paid to both sexes for harvesting. Yet for "other jobs" W4,000 was paid to men (for spraying) and W3,000 to women (for weeding). If there is a trend, it is that women's earnings are moving up from two-thirds to three-quarters of men's.

The seasonal peak demand for female labor still presents the problem of organizing domestic work as well. Midday meals are usually arranged by taking cold noodles or rice to the fields, but it is a sufficiently important issue for women's clubs to consider using their funds to establish cooking facilities in the village to cook and sell food to the workers. Another problem is breast-feeding. One landless woman claimed she had put all four of her children on (what she essentially admitted to be diluted) powdered milk from birth as breast-feeding interfered with her employment.

Korea is far from being unique in arranging land reform between male heads of household, leaving adult women in the legal position of children in relation to the land. The usual consequences are seen in Korea: women are not members of farmers' cooperatives or of the Farm Land Improvement Associations in their own right. Thus, inevitably, they have associate status in FLIA meetings, which they can attend. More important is that the earnings from the rice crop come under the control of their husbands. It was admitted during interviews that women sometimes had difficulty obtaining cash from husbands for their requirements.

Rights to land directly affect widows who share the inheritance with children. Problems can occur if the children have migrated and if their wishes on disposal of the land should differ from their mother's. In theory, land is inherited equally by sons and daughters. There is evidence, however, that sons emerge as land operators, and it is not clear to what extent their sisters are compensated.

Families, especially women, are clearly benefiting from fertility control. Family planning is widely accepted and the means of fertility control are generally known. The usual complaints of nausea from the contraceptive pill and backache from the IUD were heard frequently. An increasing number of both men and women are turning to sterilization but there is still hesitation about this operation. One rumour heard was that sterilization reduces the life expectancy of men. There is no inhibition about openly discussing birth control and abortion, and during one interview with some women, a man approached to say that his wife who was thirteen weeks pregnant had failed in an attempt to abort herself and what should she do. There is a great deal of mutual support amongst the women regarding family planning. In one case, a leader of the women's club organized an abortion and an IUD insertion for a woman who obviously could not cope with life generally.

Aspirations about family size center on having 2 to 4 children with the better-off families tending to settle for fewer than the poor

families. This fits with studies of the relationship between income and fertility. But two specific comments in causal relationships in Korea can be made. Firstly, higher income families see higher education for their children within their reach and, in the education-conscious context of Korean society, are prepared to invest unusually heavily in education and its promise of upward economic and social mobility. In this respect their aspirations accord with some of the theoretical literature on population to the effect that higher income families invest in children as in an expensive consumer durable rather than in the labor of young children. However, there is stark evidence that educational expenditure does not compete with expenditure on household consumer durables but rather with expenditure on the socially invisible items of nutrition and home technical improvements to relieve women's drudgery. This conflicts with some other theories such that better nutrition of young children and raising the status of women are means to encouraging lower fertility. These unexpected findings could be explained by the Korean cultural--and already high life expectancy--context.

Secondly, the desire of poorer families to retain comparatively large families may be a reflection of their expectations of needing to rely on child labor or earnings during part of the family life cycle as well as on the security of a number of surviving low-income earning children for parents' old age. While the poor wanted education for their children, many did not have real expectations of financing even middle school education.

One subject of well-being stood out prominently as bearing no relation to income changes. The poorest and the most prosperous mothers weaned their infants in the same way: at eight months the child was given rice soup and later on what the adults had. Not one of the almost 50 women spoken with had ever given their babies eggs. It was incongruous to sit in the living room of a house with radio, television, rice cooker and electric fan, and with chickens running around in the compound, and hear this. The older children appeared well proportioned but visual inspection suggested that the upper arm measurement test of nutrition amongst the under-twos would show a deficiency.

The absence of weaning foods can hardly be put down to fecklessness on the part of mothers for there is no sign of this in other aspects of child care. There may be a belief that babies grow on their own accord and that nothing else is required. But it also reveals a gap in the services of the health centers. The term "maternal and child health" appears unknown in the villages and this may signify a lack of information dissemination on infant nutrition.

The women were well aware of the superiority of mother's milk, but this did not stop the almost universal use of powdered milk as supplementary feeding, and in same cases it was substituted for breast-feeding sooner or later.

The increase in income enjoyed as a result of the irrigation is evident in the urban goods seen in the houses. The order of priority purchasing seems to be radio, television, followed by either rice

cooker or electric fan, and a few houses had a refrigerator. In one village every household was said to have a bottled gas stove but these were not used because of the high price of gas. Wood was still widely used as a cooking fuel with coal briquettes used by a minority. It was a little difficult to appreciate the reasons for purchasing a television at around W90,000 before a rice cooker costing W17,000. One woman explained that after working hard during the day it was necessary to relax in front of the television. Another said it relieved boredom. There are different views on how labor-saving the rice cooker actually is. But one is left wondering whether a television would come before a rice cooker in a woman-headed household.

Cleanliness is very important to Koreans and new washing points, individual compound wells and taps, have figured in Sae-maul construction where the movement has been active. But in villages not affected by the movement, household income gains are not generally used privately or collectively to improve the domestic water supply. Only the most prosperous farming families have undertaken their own private investment in water, in one case commandeering one of the two village wells and constructing a concrete platform--and wall--around it. Boys are free of domestic tasks but girls help their mothers, especially in the washing of clothes.

Nutrition improvements have come by way of more vegetables consumed and more frequent meat-eating. But in one village with an irrigation project, it was said that even the richest villagers ate meat only a few times a year. In this village about a third of the households had television. The impression was gained that television and electric fans were ranked higher than nutrition, and consequently that the satisfaction of basic needs would be seen differently by villagers and development planners.

Education is obviously the main prize of agricultural improvements. Parents borrow for education to an extent probably matched only by borrowing for agricultural production. More and more children are finishing middle school and high school, and although sons are given preference in education when finance is tight, there are no cultural inhibitions about educating daughters. Noticeable evidence of the favoring of boys in expenditure patterns comes from the streams of school boys on bicycles while their sisters almost all walk to school.

In the past, it was the great expansion of urban industry and the wide disparity between urban and rural earnings which prompted migration (especially of the young and poorly-educated). Today, although rural residents are unanimous in believing their standard of living would be higher in the cities, it is the great promise of class advancement from joining education with urban status that is the main spur.

Although women interviewed all agreed that they wanted their children to leave the countryside, some expressed anxiety over their daughters' lives in the cities. "Falling into bad ways" was uppermost in their minds. There was some evidence that migrant children weakened their links

with their village homes after a time, and failed to visit them for long periods. Even so, some mothers maintained they especially wanted to get their daughters out of agriculture because it was so hard. All the young unmarried women interviewed were adamant that they did not want to marry a farmer.

A number of respondents commented that only the poor and the old would be eventually left in the villages. Unless there is a serious and prolonged industrial recession, this migration must be seen as permanent. In this case the agrarian, and therefore the social, structure in the villages will change. Land for sale will probably become concentrated in the largest farms, as might part of the land rented out by absentee landlords. The smallest farms may well persist if the comments of villagers that only the poor and old will stay behind prove true. Even if there is not an industrial recession, it is unlikely that in the foreseeable future urban areas will be able to absorb easily all the migrant flow. Level of education will become the device for rationing out jobs with the usual result that most are over-educated for the jobs they get.

A degree of farm size and social polarization might then set in the next generation. The progress of landless and very small farm income and household welfare will depend on forms of farm mechanization and the maintenance of the rice price support.

Both sexes lacked opportunities to participate in decision-making on village-level allocation of resources and the design of irrigation projects. Even the men did not seem to be active in making requests or arguing with higher-level decisions in the farmers' cooperative and FLIA meetings. But in other social events, such as drinking and village festivities, there is discrimination or segregation between the sexes. The men on the evaluation team, concentrating on male residents, were frequently invited to join in the drinking of alcoholic brews. But none of the female residents appeared to be drinking when they were approached.

There remains one question. Do women exercise any civic function in a segregated manner within their own clubs? The answer is "Yes, but in a very low social profile, and their potential receives no official encouragement. Moreover, their co-option by the Sae-maul Movement sometimes gives the kiss of death to their former activities". At the start of the Sae-maul Movement in 1971-1972, a large number of villages had women's credit unions. The sources of funds were twofold: a little uncooked rice was placed in a pot by wives at every meal and the accumulated quantity sold by the unions; and transplanting was often performed collectively with part of the total wages bill placed in the women's credit union/club. (One village club had raised W1.5 million, or $2,500, from the former practice.) The money was sometimes used to feed those working on Sae-maul construction projects or for Sae-maul beautification activities, a form of subsidy provided by the women. More generally the funds are loaned out (at 4 percent to 5 percent a month--the market rate) to anybody, including "the poor people". It became evident in at least two villages that the women's clubs were supplying farm

working capital on credit to the poorest families. Thus, far from the rice intensification advancing women, women were supporting marginal farmers in rice intensification.

During the evaluation women were asked what they would like their clubs to do. There were two common answers: one, to provide kitchen facilities to cook and sell lunches for those working in the field at peak labor periods; two, to start a village bank. The impression was gained that women's clubs were shrewd in accumulating funds but sometimes frittered them away or allowed the Sae-maul movement to spend them. One outlet has been to invest in a village store and appoint a manageress who then takes all the profit (or loss) as salary.

Other activities of the women's clubs include disseminating information on infants' vaccinations and on family planning. They also sometimes keep an eye on women who show signs of not being able to cope. But there are also villages, including those that have benefited from irrigation, where there are only nominal women's clubs or none at all.

In conclusion it can be said that household welfare has enjoyed improvement since the irrigation schemes were completed but the advances in the satisfication of basic needs have not particularly favoured the most vulnerable household members or social groups. It is also difficult to identify any factors which have raised the social status of women.

APPENDIX E

A PRELIMINARY PROFILE OF KOREAN FARMERS AND THEIR VILLAGES

by

Kim Dong-Il

A Preliminary Profile of Korean Farmers and Their Villages

During the period of May 6-15, 1980, the Korea Rural Economics Institute carried out a social survey funded by USAID to evaluate, from a sociological perspective, the effects of A.I.D.'s 66 small- and medium-scale water projects on rural Korea.[1] Out of 66 project areas, 16 were chosen as sample sites for the survey. In the sampling areas, 60 villages which were regarded as beneficiary areas were included, and 30 more villages outside the project areas were added as quasi-control groups in our survey.[2] Since we interviewed one village leader or knowledgeable person and five other randomly selected residents (heads of household or their spouses) from each village, the total sample size of respondents amounted to 540 persons. About one third of these respondents were women.

In this paper the writer will provide a profile of rural people in the sampling areas. Also, included here is a short description of rural change that has occurred in the sample sites during the past five to six year period. Describing social change, which includes human change as well as organizational or structural change, is not an easy task. However, the writer will attempt to profile rural people and their changing life based on the data collected by our interviews with rural people using a standard questionnaire.

Rapid urbanization and industrialization occurring recently in Korea has caused a heavy migration of farmers, especially younger ones, to urban areas. In consequence, the number of rural farmers has decreased substantially during the past ten years and the mean age of rural residents has gone up steadily. In the project areas surveyed, those who were more than 50 years old were 37 percent of the total population, while this figure was 30 percent in non-project areas. The level of education also shows somewhat of a difference between the two areas. In the project areas the majority (70 percent) had elementary school education or less and only 10 percent had high school education. In the non-project area 18 percent had at least a high school education.

Other differences were also observed between the project areas and non-project villages. For example, the proportion of residents who owned a television set was 86 percent in the project areas and about the same proportion (88 percent) had the same item in the non-project areas. When we asked if they owned a refrigerator, 11 percent in the project areas and 19 percent from the non-project areas said yes. Thus, we can tell that the living standard in the non-project areas is slightly higher than that in the project areas. In the project areas over 60 percent of the resident families had an annual income of less than 2 million won (about 3,300 in U.S. dollars), whereas in the non-project areas 50 percent had an income of less than 2 million won.

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[1]Sixty-six projects were originally planned for A.I.D. support. (Editor)

[2]Nonproject areas are villages close to project sites and also have irrigated paddy. The purpose of differentiating between these groups was to ascertain the social impact of the FLIA. (Editor)

Thus, when we compare the overall socio-economic status of the project area residents with that of the non-project area, we can tell that the former is somewhat lower than the latter. This is an interesting finding in the sense that farmers in the project area have a higher proportion of irrigated land than those in the non-project areas. Perhaps the project village people had a far lower socio-economic status because of unfavorable natural conditions than those in non-project areas before the project and they need more time to catch up with neighborhood village residents.[3]

Finally, when we asked respondents what their socio-economic status (SES) was in the villages from their own self-evaluations, 22 percent of the residents in the project areas regarded themselves as having lower status, 16 percent believed they belong to the group of higher socio-economic status, and the rest of them (62 percent) said they are middle class people in their villages. A similar distribution of socio-economic status was observed in the non-project areas (24 percent lower status, 60 percent middle, and 16 percent upper status). Also, we asked what their status was five to six years ago. In both project and non-project areas the same proportion (16 percent) believed they were people of upper status five to six years ago. However, 28 percent in the project areas and 32 percent in the non-project areas believed they were those of low status five to six years ago. This means more people in the non-project areas believe they have moved to middle class from lower class in the past five to six years than those in the project areas. This finding is also interestingly consistent with the above finding that the overall socioeconomic status of the non-project area residents is higher than that of the project area farmers. The writer is not sure why this is the case. Five or six years ago before the water project, many of the project area villages were deprived areas mainly because of their health environmental conditions where they had to rely mainly on rainfall or other natural conditions for their farming. With the completion of irrigation or drainage projects, the majority of the farmers in the project areas can cultivate their land with less worry about water problems. In fact, as mentioned earlier, a larger number of farmers own or cultivate paddy lands with better irrigation or drainage systems in the project area nowadays than those in the non-project areas.

Logically, then, residents in the project areas should feel that their socio-economic condition has gone up more than those in the non-project areas in the past five to six years. However, as it was pointed out above, this is not the case. Maybe a five or six year period is too short for the residents of the project area to recognize the overall socio-economic impact of the project on their life.

However, an alternative interpretation is plausible. With the completion of the water project and increasing yields fo paddy or other crops, their hopes rise more rapidly than reality. Thus, rapidly rising expectations may have caused the farmer to feel less improvement of their

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[3]Irrigation on non-project areas was older, and thus income and education were higher. (Editor)

living standard than that which actually happened. This may explain finding that 24 percent of the project area residents feel they will attain upper class status in their villages in five years. In comparison, 39 percent of residents in non-project areas feel the same way.

Furthermore, when we asked if respondents want to move to other places, 30 percent of the project area residents said yes, in comparison to 24 percent in the non-project areas. Of course, the majority of these people desire to move to city areas.

The desire to move to other places may indicate the farmer's dissatisfaction with their work, life, or community in general. Thus, we asked respondents how satisfied (or dissatisfied) they were with their overall life conditions. In both project areas and non-project areas more than 50 percent of the farmers feel that they are dissatisfied with their lives. The somewhat lower degree of life that satisfication among the farmers does not necessarily indicate that they do not recognize the improvement in their life conditions in the past five or six years. In fact the majority of the farmers (68 percent in the project areas and 76 percent in the non-project areas) feel that their overall life conditions have improved during the past few years.

On the other hand, when the respondents were asked to express their satisfaction or dissatisfication with their community in general, the majority of rural residents (72 percent in both project and non-project areas) said that they are satisfied with their community. In particular, when they were asked to provide their perception of the degree of overall community improvement, most of them (about 90 percent in both areas) believed that their community is better off now than five or six years ago. In terms of more specific items, the majority of Korean rural people believe that overall conditions in their housing, transportation, market facilities, education, informal human interaction, contact with their relatives, and convenience in farmwork have improved during the past few years.

Next, they were asked to express their perception of change in their family income, community participation, work satisfaction, recreational activities and medical service. A little less than a half of the farmers believe their income has increased during the five or six year period. But 23 percent of the farmers in both areas feel that their income has decreased in the same period. The least improvement was found to be in the areas of work satisfaction, recreational facilities, and medical service.

In brief, farmers in both project and non-project areas feel that there has been more improvement in some areas than in other areas of their life or community in general. Overall, they believe that their life has gotten better in the past few years.

However, since farmers in both project and non-project areas expressed similar opinions regarding change in their quality of life in the past few years, it is difficult to sort out any direct impact of the water project

on the farmers' perception of their life conditions. In order to detect the farmers' opinion about the relationship between the water projects and their life conditions, we asked to what extent they thought the project contributed to the increase in their income. The majority of them believed that the water project had contributed to the increase of their family income (41 percent very much, 30 percent much, 6 percent somewhat). Also, we asked if the current water facilities are adequate for their farming needs. Sixty one percent of the farmers responded positively, whereas 39 percent said water facilities were adequate in the non-project areas.

Furthermore, most of the farmers (81 percent) feel that the water project contributed substantially to the increase in the community's development. At present, the majority of the farmers (80 percent) in the project areas belong to the Farm Land Improvement Association (FLIA) and benefit from the water project. As mentioned above, the majority of them feel that their irrigation or drainage systems are adequate for their farming. They seem to approve of the way the irrigation systems are managed by FLIA. Forty seven percent of the farmers in the project areas said that they had to rely totally on rainfall for their farming before the project. With the completion of the project, the farmers say, the average size as well as quality of their paddy land improved. Considering all of these objective changes, it is not difficult to conclude that the farmers in the project areas have benefited from the water project if just from an economic view point.

There were problems, too, related to the water project. The majority of the farmers (82 percent) associated with FLIA complained that the water fee was too high. Whether such complaints, as expressed by the farmers, are justifiable or not is not the writer's concern here. Another problem was that only 40 percent of the farmers signed the project contract voluntarily. The rest claimed that they did not sign the contract (27 percent) or signed involuntarily. Consistent with this finding is that only 60 percent felt their opinions were fully reflected in the water project. Thus, we get a picture that the community residents' participation in the project was relatively low.

The lack of the rural farmers' participation in their water project seems to be related to their mental outlook or attitudes toward society in general. For example, the majority of the farmers (over 70 percent in both project and non-project areas) feel that these days a person doesn't really know whom he can count on. Likewise, the same proportion of the rural people believe that success in business and politics cannot be easily achieved without taking advantage of gullible people. Furthermore, the majority of them feel that public officials cannot be trusted or that the world is run by a few powerful persons. Interestingly, this kind of negative or pessimistic mental outlook is more prevalent among women than male respondents. The sense of powerlessness, distrust, and confusion is often found to be more prevalent among females than males in other developing societies. This is particularly true where the whole society experiences rapid social change caused by internal or external forces. As mentioned earlier, Korea has recently experienced rapid urbanization and

industrialization which might have destroyed some of the traditional values and norms, yet no new value system has been established suitable to the newly industrializing society. When people are caught up in the transition period from a traditional social system to a modern society, the result is that they often experience a sense of confusion, uncertainty, powerlessness, and normlessness. Also, many researchers stated that this is particularly true among women. In fact, our data show that this is the case. For example, when female respondents were asked if they agree with the statement, "Women should stay out of politics", almost fifty percent of women said yes while about forty percent of males agree with it in both project and non-project areas. Consistent with this is the finding that more than 50 percent of women agreed with the statement, "Men can be trusted more than women", while over 70 percent of males believed so.

Furthermore, we asked the rural farmer how often husbands and wives discuss everyday life problems, children's education or occupation, or property management and who makes the decisions. The majority of males and females said that they discuss these with their spouses quite often, yet both agree that the husband is the main decision maker. Thus, it is quite clear that the majority of the rural women still maintain a somewaht subordinate relationship to their husbands although they witness daily that the whole world is changing. Whether it is due to the water project or otherwise, recently rural isolation in Korea has been destroyed. Rural women are exposed to modern urban life more and more due to better transportation and mass media. This exposure to urbanism would easily lead women to feel deprived or confused and it is no wonder that rural young females avoid marriage with future farmers in their village.

In conclusion, rural Korea is changing and so are rural people. Farmers have seen an improvement in their quality of life and social environment partly due to the community's developmental projects including the water projects and partly due to the spill-over effect of national growth. Nevertheless, they seem somewhat confused and dissatisfied with their life. As mentioned earlier, the reason for this disenchantment with their life may be their rapidly rising expectations. These rising expectations can be seen in the fact that over seventy percent of the rural residents would like to send their children to college. In fact, we found out that when farmers get extra income from their farming, they spend it first for their children's education.

Farmers may feel dissatisfied with their overall life conditions and, in particular, with the governmental agricultural policy (77 percent manifested dissatisfaction with the government's agricultural policy) mainly because now they regard urban people as their reference groups. Thus, when they compare their lot with urban people's life, they feel deprived. In fact, our data indicate that only a few farmers (about 33 percent in the project areas and 6 percent in non-project areas) would like to see their children becoming farmers. This is why they desire to send their children to college if they can. However, this finding that farmers suffer to some degree dissatisfaction, powerlessness, and confusion should not conceal the fact that their objective life conditions have improved during the past few years.

APPENDIX F

KOREAN AGRICULTURAL PRICING POLICIES

by

David I. Steinberg

Korean Agricultural Pricing Policies

Korean government agricultural pricing policies over the past decade have been the essential means by which farm income has risen over time to equal urban industrial worker income, a rare phenomenon in developing countries. Such an emphasis on rural equity has not been a consistent policy under all governments. Rather, it was instituted initially as a positive inducement to greater production and improved income distribution only with the advent of the military government which came to power in 1961 and implemented better pricing policies a decade later. The high prices paid by the government for rice and barley have materially and positively affected the well-being of the farmer. They have not, however, been without problems.

Korean agricultural pricing policies have been marked historically by fluctuations in the degree to which market forces and government control have operated. The U.S. Military Government misunderstood the nature of the large rice exports to Japan during World War II--exports forced on the economy by the Japanese war effort to the detriment of the Koreans. Based on this misunderstanding and with a predilection towards a free economy, the U.S. Military Government withdrew the controlled delivery, pricing, and ration system that the Japanese had introduced. The early failure of this policy resulted in the reinstitution of compulsory rice collections and a ration system.

This system was continued after the establishment of the Republic of Korea. However, this policy failed as well, as the rice support price was too low to increase production, and new technology was lacking. In 1949 the government purchase price was only about 40 percent of production costs and about 20 percent of market price.

Obviously this policy required changes but they were slow in coming, because of political and foreign assistance factors discussed below. The present policies have their legal genesis in the Grain Management Law of February 1950, which was basically reaffirmed in 1963 and again in 1967. The present system is a dualistic one, combining an element of government intervention and a free market. As in so many other elements of Korean life, the government has continuously held the legal power to control absolutely the total range of grain production, pricing, storage, sales, imports, and exports, although the degree to which this power has been exercised has varied greatly.

Government acquisition of rice is comprised of three elements: taxation in kind, direct purchase, and fertilizer/grain barter. The degree of government involvement in purchases has widely varied; in the 1950's it was less than 10 percent for rice, but by 1975 it was 50 percent. In that latter year, the government purchased 90 percent of the barley marketed. These statistics do no reflect total production, for a significant portion of production is retained by the farmer for home consumption.

Under the Syngman Rhee government, the volatile urban dweller was its primary internal political consideration, as the Korean War and the resulting peasant conservatism and the agrarian reform program of 1949 had effectively diffused rural unrest. Land ownership of paddy was limited

to three hectares. Although some farmers circumvented the law through registration under various family members, overall it was effective in destroying massive maldistribution of rural income. If Korean farmers were poor, they were generally all impoverished. Thus, the focus of government grain-pricing polcies was to keep the cost of rice and barley low for the urban market at the expense of the farmer. Tangentially, it resulted in lowering land purchase payments to landlords by tenants as a result of the land purchase programs under land reform. This low-price policy--the pauperization of the Korean peasantry--was inadvertently assisted by the U.S. PL 480 program after 1955. Under PL 480, an average of 9 percent of annual domestic grain production was imported for the 1956-60 period. PL 480 in this same period ranged from 64 to 93 percent of such imports. This proved to be a major deterrent to improving government pricing policies. Throughout the Syngman Rhee period (1948-60), in no year did the government purchase price equal the cost of production; in six of the thirteen years the purchase price was under 50 percent of the market price. In 1955, for example, the farmer lost W571 per 80 kg. bag of rice, or a total loss to all farmers that year of W1.7 billion.

The military coup of 1961 began to correct the imbalance, but it took almost a decade to transform it. The first eight years of military rule was characterized by development policies focused on industrialization and export promotion. During that period, procurement prices to farmers rose, adequately covering the costs of production, but usually under the market price. Since imports were supplied by the U.S. without foreign exchange costs to the government, there was little pressure to alter policies that seemed to have worked effectively, if not equitably.

By 1968-69, however, the incentives for change began to be felt. The government recognized that reform was required. By 1970-71, PL 480 legislation changed to dollar-repayable loans, and grain imports became a potential drain on foreign exchange. In addition, there were growing disparities between urban incomes, expanding rapidly as Korea's export drive began to shift into high gear, and rural incomes, which had stagnated by comparison. The 1971 election results demonstrated that enthusiasm for President Park was dropping in rural areas even though government mechanisms to ensure success at the polls in such areas were overwhelming. These election results were a cause of great concern, and lead directly, with the added fillip of an excess of cement production, to the origin of the Sae-maul Movement.

The Korean Government in 1969 instituted a two-price rice and barley pricing system. That is, there were different prices for both grains paid to the farmer and those that were charged the urban dweller. Even discounting the government's handling costs, for every year since 1969 except one, the government's purchase price has exceeded the cost of rice to the consumer. In each year since 1968, an even heavier subsidy was provided for the purchaser of barley (during this period the price of barley was between 40-62 percent of the price of rice). The government even encouraged the consumption of barley, forcing restaurants and hotels to mix it with rice on various occasions and exhorting the populace to do the same.

However, as farmer incomes rose, and urban grain prices were kept down, the costs of these subsidies had to be borne by some element of the economy. They were not run as deficits in the general government accounts. Instead, they were carried as an overdraft on the central bank, thus increasing the money supply which added to inflationary pressure. These subsidies increased the money supply by 13.3 percent in 1972, 20.6 percent in 1973, 68.5 percent in 1974, and 98.2 percent in 1975.

Korean government rice and barley pricing and purchasing policies have been products of a mix of political acumen and industrial growth. Even under conditions of relative industrial and export expansion, a growing number of officials have begun to question the wisdom of this approach. Now, however, Korea, like many countries, is in a period of economic stagnation. Inflation, the industrial slowdown, and drops in exports have affected the economy seriously. While there is a continued optimism among rural youth--both men and women--who seek high education as a means of access to urban employment and trek to the cities, a steady trickle of returning youth has begun as factory slowdowns lower urban employment. Some Sae-maul rural factories are shut down or working at lower productivity.

Korea is probably entering a period in which inflation will outpace government rice price increases. Farmers, when interviewed, perhaps unrealistically but almost universally complained about high costs and insufficient rice prices. Having enjoyed comparative well-being in the past few years, their concern over loss of purchasing power is natural. They may not be able to augment the agricultural tools of their trade, buy electrical appliances or other amenities of life. More importantly, they fear the potential destruction of their hopes for social mobility that finds expression in the ubiquitous concern for enhanced educational opportunities for their children. Now, the unanimous response of farmers is that they do not want their sons to be farmers or their daughters to marry farmers. One might comment that the increased participation of farmers in the money economy, better production, and more income through high rice prices and the perceived benefits from these changes have ironically led to unrealistic hopes for the future.

An unanticipated dilemma has resulted from the positive results of irrigation, high-yielding varieties of rice and a high support policy. As rice production rises and incomes increase, there is a growing unwillingness of farmers on irrigated land to grow barley as a winter crop. They find it economically unprofitable, some claiming sales do not cover labor costs alone. This, together with government slackening of purchases, will lower barley production over the next several years, at least in many project areas.

Korean agricultural pricing policies must also deal with wheat, which has become an increasingly important element of the urban diet, and is beginning to affect some rural areas as well. Wheat imports have steadily grown. In 1956-60 they averaged annually 277,300 metric tons; by 1971-75 they averaged 1,623,000 metric tons. Farmers were observed growing some wheat, but with limited success. Wheat imports in 1975 almost equalled national barley production, and wheat consumption is likely to grow.

The Korean government will have to make some difficult decisions related to pricing policies of each of its major grains. One can only hope that these decisions will not retard the clear progress that the farmers of Korea have made over the past decade.

PL 480 Imports
($U.S. Millions)

Year	Total Grain Imports	PL 480 Grain Imports	PL 480 Grain as %/Grain Imports	Total PL 480 Aid *
1956	31.2	20.0	64.1%	33.0
1960	20.6	19.2	93.2%	19.9
1962	40.1	34.4	85.8%	67.3
1963	107.2	62.6	58.4%	96.8
1964	60.8	28.0	46.1%	61.0
1965	54.4	29.7	54.6%	59.5
1966	61.3	11.2	18.3%	38.0
1967	76.6	7.9	10.3%	44.4
1968	129.3	27.3	21.1%	55.9
1969	250.3	31.6	12.6%	74.8
1970	244.8	33.0	13.5%	61.7
1971	304.0	18.0	5.9%	33.7
1972	282.7	-		-
1973	444.1	-		-

Source: Ban, etc. Rural Development. Studies on the Modernization of the Republic of Korea; 1945-1975. Cambridge: Harvard University Press, 1980.

* Includes Cotton, etc.

APPENDIX G

CHANGE, LOCAL GOVERNMENT, AND RURAL PARTICIPATION IN KOREA RURAL DEVELOPMENT

by

David I. Steinberg

Change, Local Government, and Rural Participation in Korea Rural Development

The Setting

A transformation has occurred in rural Korea. The visitor, returning after a decade, cannot help but be struck by the changed landscape. Barren, brown hills, ubiquitous throughout the peninsula in the past, are gone. Korea is verdant; every hill seems reforested in what must be one of the major, long-term successful interventions of this type at a national level--an investment for future generations.

Although less obvious, there has been a manicuring of the landscape, and intensification of cultivation and land use that is reminiscent of Japan. It is evident not only in small, almost urban-size, plots of market vegetables, and in the terraced rice and pepper fields that climb the hills; it is exemplified in the use of plastic--as a greenhouse to expand the growing season in this temperate climate, and as a weed suppressant and moisture retainer on numberless pepper and vegetable plots throughout the country.

Housing has been rebuilt. Thatch roofs are a rarity; bright red and blue tiles are common, sometimes new tin coverings are camouflaged with these colors. The traditional U- or L-shaped Korean house has often given way to modernistic westernized homes, a bastardization of modern and rococo, supplied in various standard models by the Ministry of Home Affairs. Occasionally, along a street or road, one sees a new anonymous facade masking a traditional home, often of some dignity. What rural Koreans may have gained in comfort they have lost in aesthetics.

Mechanization is everywhere. Hand tillers and mechanical threshers are seen in the fields, and now it is the cattle-pulled plow that is more a cause for comment. Television is almost as prevalent as in the United States. Fans cool in the hot, humid Korean summer. The electric rice cooker saves the housewife untold hours every year. Refrigerators are no longer an oddity.

Fifteen years ago Korea had few rural paved roads. Even most major highways were enshrouded in clouds of dust. Now a network of paved roads criss-crosses rural areas, and bus traffic and truck services have been extended into the rural hinterland. Goods of all description are in rural market towns. People are better dressed; bicycles take children (boys if not girls--for there is clear discrimination here) to middle and high schools where in the past, if they went at all, they had to walk.

These changes illustrate that Korean farmers are perhaps unique among the rural population of developing nations--their incomes equal those of the urban industrial work force. This is a far cry from the spring months of hardship before the crops were in and winter stocks were depleted that farmers experienced not too many years ago. Yet these remarkable developments have taken place in an atmosphere substantially different from that which the textbooks on rural development popularize.

That atmosphere is a product of a bureaucratic milieu that pervades Korean development efforts in rural areas. It is one that is strongly hierarchical in nature, consciously drawing on the Confucian virtues of paternalism and respect for authority, and espousing ideological conformity. On the surface it is a configuration that seems little suited to the ethos of rural development as a participatory experience. It has been heavy-handed and autocratic. Yet without question change has taken place, and although farmers may grumble, they are quick to articulate the overall benefits they have received while treating mobilization efforts with considerable scepticism.

Rural Administration

Korea is a highly centralized state that has not permitted the autonomous growth of local representation, local leadership, or pluralistic centers of power divorced from the central authority. In spite of diverse ministerial functions that extend down to rural areas at the gun (county) level, the heart of local administration, real power is vested in the Ministry of Home Affairs. It is this ministry that manages the dual responsibilities of coercion: the police and local administration. It coordinates all activities, and has appointive functions, as in agriculture, and managerial responsibilities, such as in health. No other ministry in Korea has such broad responsibilities nor such capacity to influence rural activities.

Rural Korea is divided into nine provinces, each of which has a governor appointed by the central government. There are no elections for local offices. The provinces are subdivided into 140 gun, which in turn are divided into 1,382 myon, or townships. The gunsu (county chief) and the myonchang (township head) are all appointed by the Ministry of Home Affairs.

The county is the nexus of rural development. Officials from other agencies, such as those of the Ministry of Agriculture (the Agricultural Development Corporation, the cooperatives, etc.) all coordinate their functions through the county chief. Overall targets for rural development are set by the center and programmed through the county chief, who ensures that such goals are met. Some local initiative within nationally determined guidelines is possible. The county does prepare annual budgets for the provincial administration based on national plans. However, only a very small amount of money is available for locally suggested development programs. Eighty percent of county funds are provided by the center. Major initiatives emanate from Seoul.

In addition to the county government, and its extension--the township officials--there are four organizations on which villagers participating in irrigation systems depend. These are: the guidance extension service of the Ministry of Agriculture, the local branch of the National Agricultural Cooperative Federation, the Sae-maul Movement (New Community Movement), and the Farm Land Improvement Association (FLIA--irrigation association). These organizations, under the leadership of the county chief, control the supply of agricultural commodities and technical assistance. They purchase and store selected grains, provide credit, manage water and set water rates, and determine social and economic targets for improvement in homes and fields. They mobilize both men and women, even attempting to instill ideological conformity.

Farmers' initial voluntary participation in these efforts is, in fact, a fiction. They are required to become involved in each of these activities, and have little or no say in their operation, except as their personal prestige can sometimes gain favor for their particular interests. That is not to say that farmers, generally pragmatic in approach, do not use centrally controlled systems for their improvement, nor does this mean that they may not eventually value their association with them. Farmers often employ them with alacrity, but the initial project initiative has generally been a product of national planning. Local participation has become a fact, but ex-post facto.

The Office of Rural Development (ORD), a largely autonomous organization within the Ministry of Agriculture and Forestry (in 1973 renamed the Ministry of Agriculture and Fisheries) was established in 1962 by the Park government with the assistance of A.I.D. Under it, at each county and in some townships are located the rural guidance offices that are devoted to the development of food reserves, improving farm income, and demonstration, technical assistance, and training. Unfortunately, the guidance service has little material to offer the farmer except advice, although such advice in an authoritarian system contains elements of command. Its influence is widespread and in contrast to many other societies, the extension workers do get out into most of the villages in their domain.

The National Agricultural Cooperative Federation (NACF) has a central office in Seoul, nine provincial and 140 county offices, about 1,545 primary cooperatives and some 145 special cooperatives, with a total of some 2,080,000 members, representing between one-fifth and one-quarter of the nation's families, or perhaps half of farm families. The NACF is charged with increasing agricultural productivity and improving rural life, objectives similar to those of the ORD and the Sae-maul Movement. Of particular importance is the NACF role in supplying credit, for which there is a great demand. The NACF also sells machinery and commodities and stores agricultural produce. Their warehouses with their distinctive logo seem everywhere--their construction was supported by A.I.D. The NACF also assists in marketing.

The New Community Movement (Sae-maul Undong - lit., new village movement) was an attempt begun in 1971-72 ,to improve the lot of the farmer after President Park had found that his support in rural areas had materially eroded in the election of 1971. In the first decade after the formation of the military government in 1961, an urban-based industrialization and export policy had been fostered with a rapid decline in rural living standards relative to those in urban Korea. The Sae-maul Movement was born of a political desire to generate rural support for the regime. It coincided with an excess of cement production in 1971. This felicitous combination resulted in 300 bags of cement to each village in the country for community projects. Because of presidential interest, the movement has been characterized by great vigor and bureaucratic elan. Attention has been concentrated on activities similar to those associated with the community development efforts, supported by A.I.D., in Korea in the 1950's. With new central backing, however, it has had a marked impact in contrast to previous attempts at rural transformation. It has achieved these results not without a substantial, and required, investment of farmer labor, time, and money, with returns sometimes delayed well into the future. However, as it has been noted (Ban, Moon, and Perkins, 1980, p. 278), "There is no doubt that the NCM (New Community Movement) has speeded up the pace of social and economic change in rural areas."

The Sae-maul Movement has been ubiquitous. It reached to every part of the country. Government-sponsored, it has generated an enormous amount of self-help, both in terms of voluntary labor and in donated funds. The distinction in rural Korea, with the Ministry of Home Affairs controlling both police and administration, between voluntary and corvee labor, and donations and extortion is not clear. If physical coercion was not used, then a heterogeneous combination of peer pressure, shame, self-interest, and subtle control over access to farm commodities and credit probably were.

During 1978 alone, 36,000 villages had some form of Sae-maul activity, with Won 634 billion used from private and public sources, and 271 million mandays of labor "voluntarily" donated. From 1971-78, Won 2,000 billion was invested for Sae-maul projects, of which only 22 percent was government-generated. The IBRD has also supported Sae-maul projects.

Project emphasis has shifted over time. Cement was provided for roads and bridges. Tin was available for roofing, replacing thatch, a change of marginal economic utility but one that the government hoped would make farmers feel more modern, and make the populace believe Korea was progressing. Since 1975, activities have focused on improving farm household income and more recently on rural housing. Whole villages in some cases, individual houses in others, have rebuilt their houses in new, modern design. Standard blueprints are provided by the Ministry of Home Affairs, with a 25 year loan provided at low interest with a five year grace period. Rural Korea may have gained in comfort what it has lost in tradition and aesthetics. Now, as Korea enters a recession, loans have begun to come due. What seemed like easy money in a period of prosperity may become difficult to repay in times of adversity.

The Sae-maul Movement has fostered the growth of industry in rural areas. From 1973-77, about 500 Sae-maul factories have been operating, although about 40 percent have been underutilized. These factories employed about 151,000 man-years of labor, and exported $438 million in goods--about 2 percent of total exports during that period. Eight hundred fifty thousand rural people have been trained in some sort of vocational skill under the movement. Visual evidence indicates that these factories, in rural areas with increased transport costs, may not be able to withstand even a modest recession. It is likely that rural manufacturing under the Sae-maul program may falter.

Korean sources recognize the need to change from forced to real local participation in the future. One noted:

> Voluntary participation of the people in planning and implementation of Sae-maul projects should be promoted for their maximum commitment and contribution to the success of Sae-maul Undong. The current tendency of forced modernization by government apparatus should not be continued to work in view of social and political context of rural communities in the 1980's.
>
> (Whang, 1979, p. 126.)

Korean government investment has dropped in the past several years and, given the economic stringency that Korea currently faces, further large-scale government investment may lag. If so, will current Korean dissatisfaction with military authorities translate into a reluctance to voluntarily contribute to Sae-maul projects? The answer is unclear.

The Sae-maul movement has been supplemented with the Sae-maum ("New Heart" or "New Mind") Movement. It's object is to instill Confucian ideology, conformity, and foster values such as loyalty to the state, filial piety, and a work ethic that those acquainted with Korea would think already existed. It is a movement that has been used to find a positive focus for anti-communist ideology and justify authoritarian control. Its slogans, sometimes carved in stone at considerable expense, are widespread, yet skeptics doubt that it will change attitudes. It is reminiscent of the Kuomontang-sponsored "New Life Movement" in China in the 1930's. It may have as ephemeral an effect.

The Farm Land Improvement Association (FLIA) is the mechanism through which farmers band together to handle irrigation. There are 123 FLIAs throughout the country. The functions of these organizations are water control and construction of irrigation and drainage systems and maintenance. The officers in charge of the FLIAs are appointed by the government; the FLIAs larger than 5,000 hectares are centrally appointed, and those of less than 5,000 hectares chosen by provincial governors. Each FLIA table or organization is determined by government. Ditch tenders are appointed on a seasonal basis, each controlling the distribution of water to an average of 50 hectares. Some inequities in water distribution have been noted in time of drought. FLIAS require year-round maintenance

and operation expenses, but farmers pay water costs to the FLIA only after harvest, thus forcing the FLIA to borrow from banks at the high commercial interest rates, a burden passed on to the farmer through higher water fees.

Because of the nature of irrigation systems, and because the choice of such systems is made centrally, farmers seem to have little to say in their operation nor can they demure from participating in them. They cannot change from paddy production to any other crop or take land out of production for non-agricultural use without governmental approval. To call the FLIA a type of cooperative is cant. It is a centrally controlled mechanism to extract payment for water delivered. It functions well on engineering and construction, but it is not a product of consensual choice. Villagers have no idea of how the charges are calculated. Even at the local level, the well-being of the villagers seems beyond bureaucratic ken.

With local elections still a rather dim vision among some political thinkers in Korea, and with major control in the hands of the Ministry of Home Affairs, there is little likelihood that farmer participation in a more egalitarian and autonomous rural structure will evolve in the near term. The bureaucratic system also reinforces and is reinforced by the hierarchical structure of Korean society, in which important distinctions are made on the basis of yangban (gentry) and commoner status, clan, education, and official rank. Farmer participation is, therefore, an element of improvement in Korea that is not likely to occur readily.

The Model?

The visible signs of development are everywhere, although poverty, and in some places severe poverty, exists. Progress is being made in remote areas, in spite of the farmer in one such village who answered a question about Sae-maul activity in his village by remarking, "Why should there be? We are not along a highway?"

Korea has progressed in her industrialization and export promotion, although the human price paid for this growth--a generation of underpaid men and especially women--is too often overlooked. It has been discussed widely, many calling it a success story. There is also a tendency to regard Korea's rural development as an export model that may be suited to other societies. This is an attitude officially fostered in Korea. To what extent is this justified?

Korea has had several national characteristics that, together, form a unique pattern that is not replicable. Korea is the only ethnically homogeneous nation on the Asian continent, it has a strong Confucian tradition with its concomittant stress on education, a trained and responsive bureaucracy, a strong hierarchical structure, and a sense of pragmatism unfettered by strong traditional religious beliefs that might impede change.

The lack of divisive ethnic groups, and thus the potential for closer bonds between the bureaucracy and the rural people than in more ethnically heterogeneous societies, is a major advantage that the states of South and Southeast Asia and Africa lack. Confucianism has given the Korean a sense of a stable world order at the micro-level, where the roles of all are understood, not only between family members, but within the village and between the village and local administration. The Confucian stress on education has meant that there is a desire for it as an end, but more importantly as an avenue of social mobility. The vigor and competence of the bureaucracy are apparent, although it can be a two-edged sword. The Korean bureaucracy, like many, tends to be more responsive to its upper reaches than to its clients in the villages.

Korea has followed an authoritarian path to rural development. It has made marked changes, but those who might argue that this is the only way for progress, those who deny the possibility of growth with participation, are advocating a self-fulfilling prophecy. Stating that Korea needed strong authoritarian leadership at the local level because a more pluralistic approach would fail is a weak case, for it was not tried in the Korean context.

Korean rural development has had a profound influence in the villages. The country-side will never be the same. It is not necessarily, however, an administrative model for other societies to emulate.

APPENDIX H

DONOR EXPERIENCE IN IRRIGATION IN KOREA: THE IBRD EXAMPLE

by

David I. Steinberg

Donor Experience in Irrigation Projects in Korea: The IBRD Examples

A large number of projects that relate to irrigation have been supported by foreign donors in Korea. Some of these have been major multipurpose dam and hydroelectric projects and major river basin development. However, two projects supported by the IBRD may be relevant to the A.I.D. experience. Both have been completed, and both evaluated by the IBRD and Korean academicians. These are: 1) the Pyongtaek-Kumgang Irrigation project, with a Bank investment of $45 million, and additional $13.02 million having been added later due to an exchange rate adjustment; and 2) Yong San Gang Irrigation project, with Bank funds of $33 million in loans, and an additional $15 million in credits.

The Pyongtaek-Kumgang project agreement was signed in May 1969 and its estimated completion data was December 1976. Because of inflation and exchange rate changes, the project had a cost overrun of 45 percent, and a time overrun of 46 percent. The economic rate of return had initially been calculated at 14 percent, and on completion this figure turned out to be accurate because of rising rice prices and yield increase which exceeded original estimates.

The project irrigated 27,730 hectares (35,190 were planned) on the West Coast, and was administered by the Agriculture Development Corporation (ADC). Two estuary dams were constructed, and reclaimed tidal land. The IBRD rated the performance of the ADC as "outstanding." The ADC, under the Rural Modernization Promotion Law of December 1969, was created by merging the Groundwater Development Corporation and the Union of Land Improvement Associations (ULIA).

Problems encountered included the design and construction of the estuary dams, difficulties of irrigating upland, and the relatively high cost of land consolidation.

The original design of the project did not calculate increased returns from the high-yielding varieties, which were just being introduced at that time. Farmer acceptance of these strains was unclear. Original estimates for yields in 1969 were 2.0 tons of rice per hectare, and 1.5 tons of barley. The expected return was 4.0 tons of rice and 2.5 tons of barley. However, these figures were underestimated, so that yields are now expected to be 4.9 tons of rice per hectare, and 2.8 tons of barley.

Because of the tight turnaround time for double-cropping barley and rice, tractors were purchased to speed the transition time. Cropping intensities (barley) are expected to increase from 5 percent to 45 percent in one area of the project, and from 20 percent to 70 percent in the other area. With some farmer dissatisfaction with barley or perhaps more accurately, with increased reliance on rice, it might be worthwhile to see if this high level of double-cropping is sustained. It has not been maintained in the A.I.D.-supported projects.

After completion of the project irrigation systems, responsibility for their operation and miantenance was transferred to the Farm Land Improvement Associations (FLIA); in turn they sub-divided into farmer groups that manage about 50 hectares and are also the contact point for extension agents and the collection of water charges.

The loan agreement stipulated that the ROK agree to levy water charges to cover all operation and maintenance costs and 40 percent of capital costs. Under the Land Improvement Law of 1969, the ROK subsidizes 60 percent of irrigation projects. This was raised in 1970 to 70 percent. Costs to the farmer run about $170 per hectare per year, or 12 percent of "average incremental agricultural income." Collection rates are as high as 96 percent.

Farm income, based upon 1978 prices, would have been W767,000 before the project, W886,000 without the project due to normal yield and price increases, and W1,330,000 at full development, "reflecting an incremental increase of 50 percent." Farm income before the project was 50 percent of the national average, but by 1975 it was 25 percent above the national average farm income.

The Yong San Gang project agreement was signed in February 1972, and the project completed in December 1978. There was a cost overrun of 95 percent and a 50 percent time overrun. The economic rate of return was calculated to be 13 percent. The project irrigated 32,300 hectares.

At the time of project design, rain-fed yields were 2.4 tons per hectare of milled rice, and it was expected that this would rise to 4.2 tons per hectare. Since the high-yielding varieties have been introduced, rain-fed yields average 3.2 tons per hectare, and irrigated yields 5 tons per hectare. Water charges are being paid at a 97 percent collection rate to the Yong San Gang Farm Land Improvement Association, under which distribution of water is carried out by over 375 farmers' "cooperatives" (Hung Nong Gae).

Farmers hold an average of 0.9 hectares, with the range between 0.5 and 2.0 hectares. In 1971 prices, per capita income was projected to increase from $85 to $180. Rice yields are expected to be 5.4 tons per hectare, and barley 3.0 tons. Barley intensity is expected to increase from 60 percent to 70 percent. Farmer repayment in 1971 prices was estimated to be $90 per hectare, or betweeen 16 percent and 21 percent of incremental farm income at full development. By 1978 charges per hectare were $132 per year. At full development these charges, including capital repayment, will be $178 per hectare per year, or about 7 percent of estimated farm income. The project will increase farm income by 30 percent (falling short of the projected 50 percent increase), but the absolute levels anticipated will have been reached. This was due to the unanticipated early use of the high-yielding varieties. Per capita farm income is expected to be $434. The poverty level in Korea in 1978 was $270.

The ROK-IBRD investments in irrigation for these projects are a small proportion of the Won 276 billion invested on irrigation from 1962 -1978 to raise irrigated hectarage from 682,000 to 1,122,000 during that time. In fact, the irrigated paddy area ratio increased from 56 percent to 85.5 percent during the same period. There were over 69,000 small farmer-run irrigation systems by 1978, of which 9,940 systems are operated by the Farm Land Improvement Association (FLIA). In addition to A.I.D. and IBRD funding, the ADB, FAO, and OECF also contributed to this development.

In a Korean-conducted survey of small IBRD irrigation projects, farmers (26 percent) indicated that land consolidation should come

together with irrigation, 17 percent said that farm mechanization was necessary because of labor shortages, and about 22 percent said they had problems with drainage. The internal rates of return on small IBRD pump and gravity systems was 12.41 percent at international prices, and 16.60 percent at domestic prices. In general, pumping systems yielded a higher rate of return (17 percent to 9.5 percent) because of the added costs and construction time for gravity systems. Average costs to develop one hectare of irrigated paddy was Won 1,750,000. Benefit-cost ratios indicated that all studied projects were economically feasible using a 3.5 percent discount rate. However, when a 10 percent discount rate was used, one-half of the projects were not economically feasible. Reservoir projects are particularly vulnerable with current construction costs, lead times, and world rice prices.

APPENDIX I

KOREAN STATISTICS RELATED TO AGRICULTURE AND RURAL INCOME

Korean Statistics Related to Agriculture & Rural Income

Farm Household Income	1963	1965	1969	1971	1974	1975	1976	1977	1979	1980
Per capita farm income* Current Won (000) per year	93	112	218	356	674	873	1,156	1,432		
Index of prices received by & paid by farmers (1970=100)	15	18	36	61	119	155	211	260		
Grain prices received by farmers	(1962) 29.4		(1970) 100.0		240.5	303.1	269.2	379.7		
Prices paid by farmers	(1962) 31.8		(1970) 100.0		192.5	237.9	297.1	347.8		
Consumer Price Index		27.5	(1970) 49.1		79.8	100.0	115.3	127.0	145.3	171.9
Wholesale Price Index		28.8	(1970) 42.0		79.0	100.0	112.1	122.2	136.5	162.1
Exchange Rate (Won per US$)		266.2	(1970) 310.4		405.9	484.0	484.0	484.0	484.0	580 (Jan.)

* Non-agricultural farm household income was in 1975 18.1% of total farm household income and in 1977 it was 27.7%.

Agriculture as a percentage of national income

1961	35.6%
1971	24.2%
1977	19.2%
1978	16.6%
1979	16.4%

Employment in the agriculture & forestry sector

1963	4,644,000	60.6%
1970	4,826,000	49.5%
1975	5,123,000	43.3%
1978	4,920,000	36.5%

Sample Farm Households

	Family Size	Farm Workers	Cultivated area (000 pyong) Total	Paddy	Current Farm Income (won)	Grain Consumption
1965	6.29	3.15	2,878.33	1,824.96	112,201	3,770.54
1974	5.66	2.86	2,900.18	1,693.54	674,451	3,234.10
1977	5.52	2.74	3,001.36	1,859.86	1,432,809	3,800.00

Korea

Self-Sufficiency Ratio of Rice, Barley, and Wheat
(Percentage by Harvest Year)

Year	Rice	Barley	Wheat
1961	99.5	95.5	33.9
1968	94.3	98.7	15.7
1969	81.0	95.6	15.1
1970	93.1	106.3	15.4
1971	82.5	91.8	10.7
1972	91.6	93.2	7.4
1973	92.6	82.9	4.8
1974	90.8	78.4	5.0
1975	100.5	100.8	5.5
1976	103.6	102.9	4.5
1977	108.6	48.5	2.3
1978	103.8	119.9	2.1
1979	86.0	117.0	2.4

Source: EPB Handbook of Korean Economy

Production and Imports of Rice and Barley

	Rice Imports		Barley Imports		Production (000 MT)	
	000 MT	Value Mission $	000 MT	Value Million $	Rice	Barley
1963	1172.	17.5	207.5	13.8	na	na
1969	631.3	120.5	107.1	7.5	4,090	1,679
1972	632.6	103.0	330.5	22.1	3,957	1,807
1974	364.7	153.1	492.2	84.5	4,445	1,394
1975	482.6	195.1	536.0	106.6	4,669	1,709
1976	179.6	47.0	4.1	0.8	5,215	1,765
1977	64.9	14.2	324.8	39.7	6,006	769
1978	-	-	-	-	5,797	555
1979	502.0	163.8	-	-	5,565	584

Government Rice and Barley Pricing and Purchases

	Rice Purchasing Ratio (1970=100)	Rice Output Index (1970=100)	Govt. Rice Purchases As % of crop	Barley Purchasing Ratio (1970=100)	Barley Output Index (1970=100)	Govt. Barley Purchases As % of crop
1961	92.7	94.7	8.3%	121.1	68.2	3.8%
1971	109.8	101.5	12.6%	120.0	93.2	7.9%
1971	122.2	100.5	12.8%	136.6	95.5	16.6%
1973	116.7	106.9	11.6%	128.9	84.7	19.1%
1974	125.4	112.8	16.8%	121.7	81.4	22.4%
1975	128.5	118.6	17.2%	137.4	99.2	28.8%
1976		132.4	20.0%		106.4	32.4%
1977		152.5	23.4%		45.9	23.3%
1978		147.2	23.4%		83.2	35.9%
1979		141.3	23.4%		87.5	37.1%

Irrigation
(000 Hectares)

Year	Total Paddy	Irrigated	Partially Irrigated	Rainfed
1952	1,226.3	535.0	278.8	412.6
1956	1,093.2	538.6	279.4	275.2
1960	1,202.9	629.1	285.5	288.3
1965	1,198.9	702.3	298.7	197.9
1970	1,183.5	847.8	223.2	112.6
1974	1,268.9	892.6	288.6	87.8
1978	1,311.9	1,121.7	190.2	-
1979	1,311.0	1,153.0	158.0	-

Fertilizer Consumption

1961	308,494	Metric tons
1971	605,137	" "
1975	886,208	" "
1978	916,000	" "
1979	914,000	" "

Power Tiller
(Number)

1961	12
1971	16,842
1975	85,722
1978	194,780
1979	235,909

Rice Production Costs and Sale Prices
(Won per 80 Kg.)

	Govt. Purchase Price	Cost of Production	Market Price	Purchase Price As % of Production Cost
1959	1,059	1,300	1,368	81.4%
1961	1,550	1,377	1,768	112.6%
1965	3,150	2,672	3,419	117.9%
1968	4,200	3,403	5,140	123.4%
1969	5,150	3,565	5,784	144.5%
1970	7,000	4,642	7,153	150.8%
1971	8,750	4,682	9,844	186.9%
1972	9,888	6,115	9,728	161.7%
1973	11,377	6,578	12,175	173.0%
1974	15,760	7,959	17,821	198.0%
1975	19,500	12,434	30,479	
1976	23,200	13,891	29,543	
1977	26,000	15,171	32,006	
1978	30,000	20,665	52,228	
1979	36,600	n.a.	57,197	

APPENDIX J

IRRIGATION SITE VISITS

Irrigation Site Visits

	Irrigation Site	Province	Gun	Myun
1.	Gun-am (君子)	Kyunggi	始興	君子
2.	Goon-pyong (軍坪)	"	抱川	青山
3.	Keum-dong (金東)	North Chungchong	中原	東良
4.	San-nam (山南)	North Kyungsang	聞慶	山陽
5.	Mae-ho (梅湖)	"	尙州	沙伐
6.	Chang-woon (昌原)	South Kyungsang	昌原	代山
7.	Ha-nam (下南)	"	密陽	初同
8.	Jang-yoo (長有)	"	金海	長有
9.	Yoon-nae (輪內)	"	咸安	輪內
10.	Myung-kwan (名館)	"	咸安	郡北
11.	Ku-mon (九湾)	South Cholla	求礼	九湾
12.	Do-bong (道峯)	North Cholla	任実	三溪
13.	Man-kyung-gang (萬頃江)	"	金提	裡里
14.	Se-do (世道)	South Chungchong	扶餘	世道
15.	Yeo-ju (驪州)	Kyunggi	驪州	驪州(邑)

APPENDIX K

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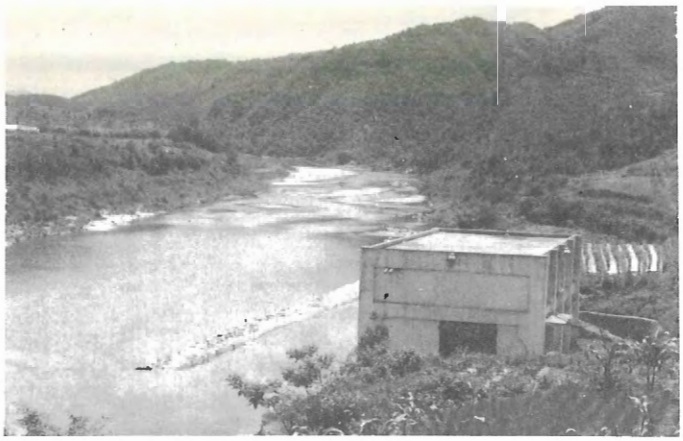
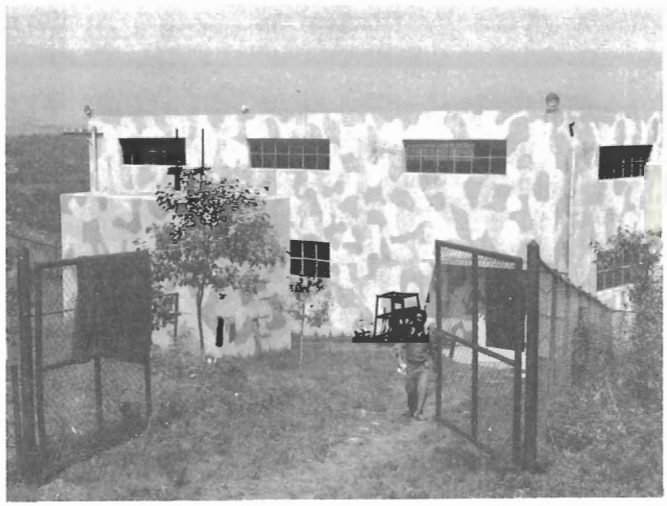
APPENDIX L

PHOTOGRAPHS



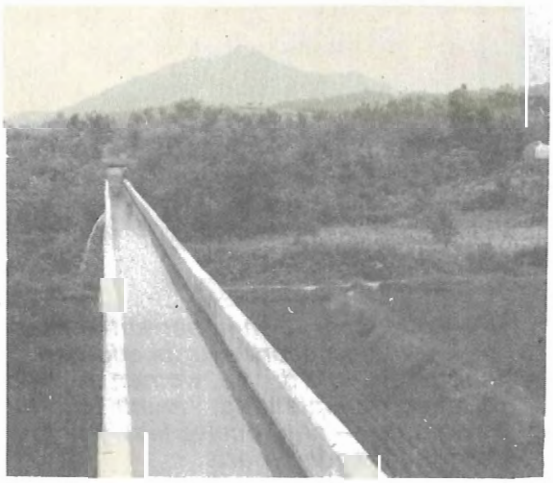
With A.I.D. funds, the Government of Korea has constructed pumping systems for irrigation throughout the country. Most designs are similar to this one at Goong-pyong, ten miles from the North-South Korean border.

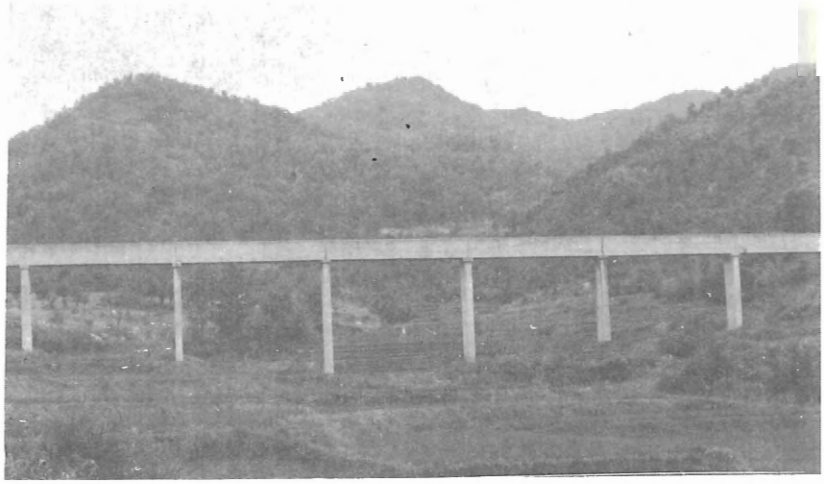


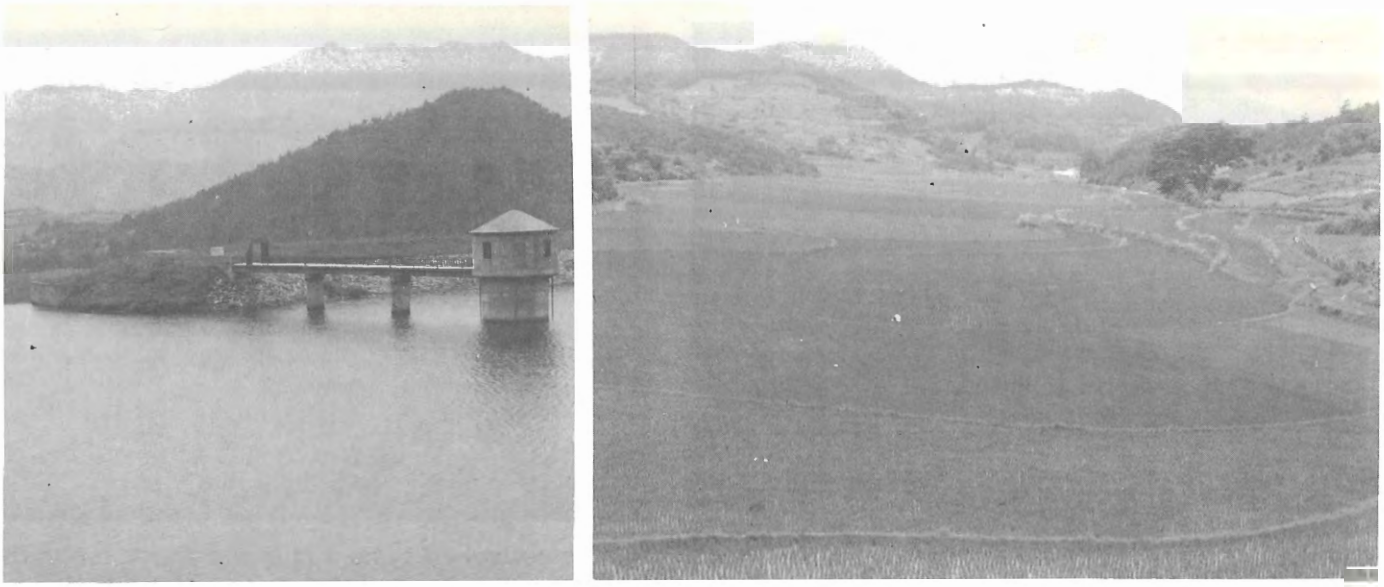
This camoflagued system is in the south, along the Naktong River, where there is less of a threat.

Inside, irrigation pumps are well maintained, and are quite sophisticated in design and use.

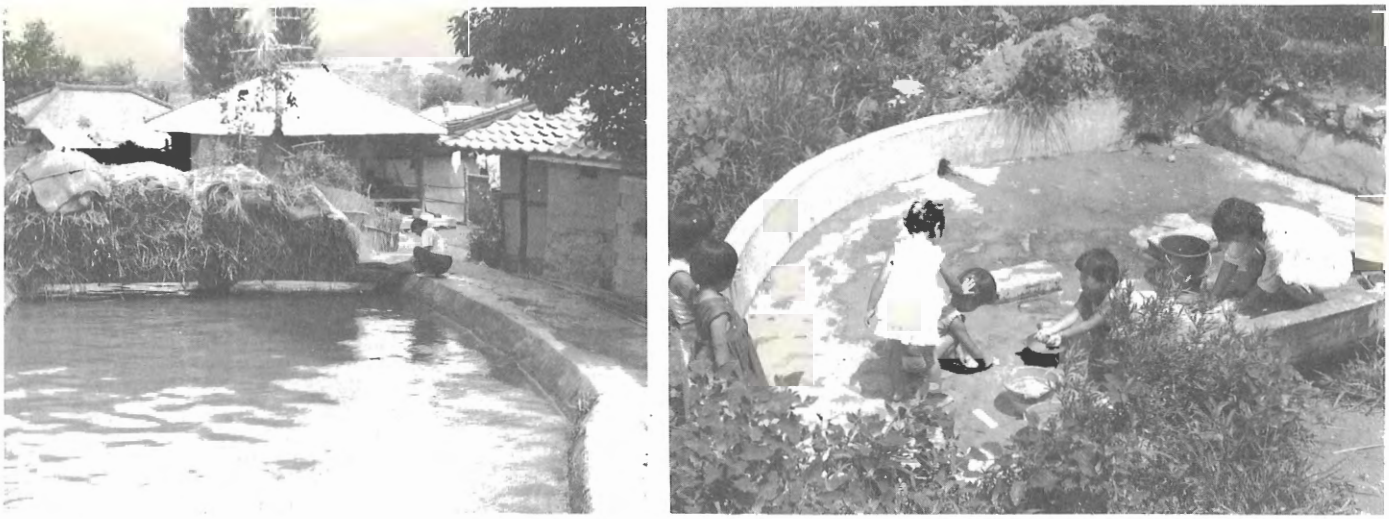
This care is extended to the aquaducts, often carrying irrigation water long distances via elevated networks.







Here, in South Cholla Province, a reservoir system constructed with A.I.D. funds is the basis for the gravity flow of water for the irrigation canals. Photo on right is a valley irrigated by one such system pictured during the mid period of a rice-growing season.

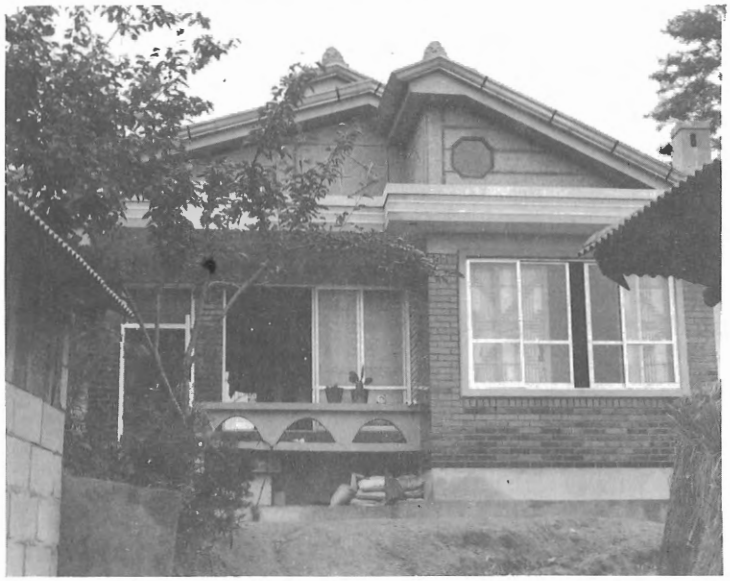


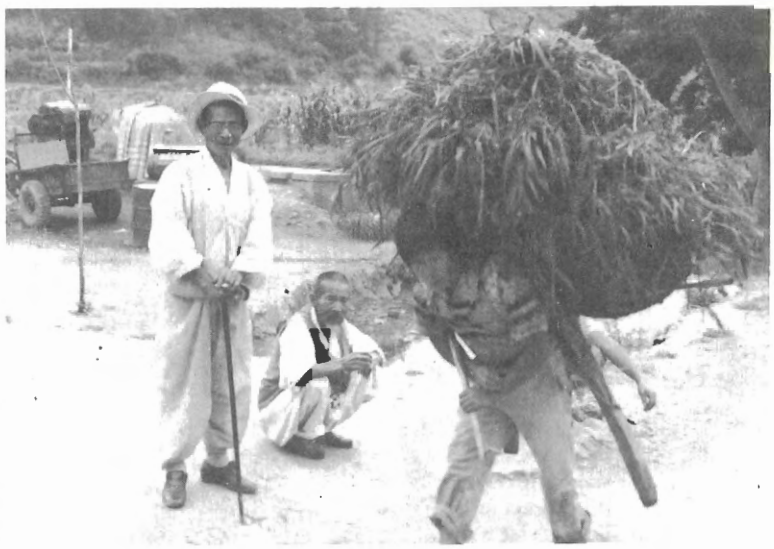
Irrigation canals also serve as washing points for village women. This chore is still performed in the traditional manner, often with assistance from the younger members of the community. Heavy use of pesticides and fertilizers may cause health hazards.

Womens' labor is an important element in the village economy. In addition to their household duties, women do most of the transplanting, much of the harvesting — and receive less pay than their male counterparts.

Soon it may be difficult to say whether traditional communities are interspersed with modern elements or vice versa. Villagers gather at the ***Sae-maul****-constructed meeting house. Note the thatched roof on the structure next door.*

Under the ***Sae-maul*** *program, Korean homes have been given non-functional facelifts, moderized homes have been constructed, and, sometimes, whole communities have been rebuilt. At right, a traditional Korean house. Although poor, the family still has a television set.*





Farmers still carry crops and fertilizers to and from the fields on the A-frame, a mode of conveyance over 1,500 years old. Note the tiller in the background of the photo on right.

While tillers, too, are used to transport crops, here a tiller engine has been mounted on a chassis. Carrying a locally constructed tank containing ***makkoli****, or rice beer, a village entrepreneur will deliver 5 gallons to the home for $2.50.*

Certainly, a healthy indicator for the future has been the disappearance of skin disease, once so prevalent in rural Korea.

APPENDIX M

NOTES ON THE AUTHORS

Notes on the Authors

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Dr. Kim is the Director of the Rural Sociology Research Division of the Korea Rural Economics Institute. He is a graduate of the College of Law, Seoul National University, and received his M.A. and Ph.D. in rural sociology from the University of Kentucky. He taught at West Virginia and Moreland State Universities, and is the author of "Professional Competency, Autonomy, and Job Satisfaction among Social Workers in an Appalachian Rural Area" (Social Thought), and "Effects of Technology in Industrialized and Industrializing Societies." (Sociology of Work and Occupations.)

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Mr. Morrow is an agricultural economist with the Bureau for the Near East in A.I.D. He has served four years in Korea, and has broad experience in such developing countries as the Philippines, Iran, and Vietnam. Mr. Morrow was educated at North Dakota and Vanderbilt Universities and has an M.S. from the University of Minnesota. He has published articles on rural credit and land reform in Korea, and on land reform in the Philippines.

Ingrid Palmer

Dr. Palmer is an independent consultant who has worked extensively on problems of economic and social development. She was educated at Bristol and Queensland Universities, and received her Ph.D. from the Australia National University. She has taught at Queensland, Birmingham, and Hull Universities, and has worked for the UNIDO, the ILO, the FAO, and the UN Institute for Social Development. She is the author of State Trading Organizations in Developing Countries, The Economy of Indonesia Since 1967, and The New Rice in the Philippines and Indonesia, as well as numerous monographs and articles.

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Mr. Steinberg is with the Office of Evaluation, Bureau for Program an Policy Coordination, A.I.D., and was formerly Director of the Office of Technical Support, Asia and Near East Bureaus. Educated at Dartmouth College and Lingnan University (Canton), he has an M.A. from Harvard University and did graduate work at the School of Oriental and African Studies, University of London. He is the author of Korea; Nexus of East Asia and translator of In This Earth and In That Wind: This is Korea. His volume, Burma: The Road Toward Development, will appear in 1981. He has written extensively on Korea and Burma. For five years he was the Representative of The Asia Foundation in Korea.

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